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(19)日本国特許庁（ＪＰ）　(12)公開特許公報（A）　(11)特許出願公開番号
特開2000－62335
（P2000－62335A）
(43)公開日　平成12年２月29日(2000.2.29)

(51)Int.Cl.'		識別記号	FI			テーマコード'(参考)
B41N	1/08		B41N	1/08		2H025
B01J	35/02		B01J	35/02	J	2H096
G03F	7/00	503	G03F	7/00	503	2H114
	7/004	521		7/004	521	4G069

審査請求　未請求　請求項の数6　ＯＬ　（全 11 頁）

(21)出願番号　特願平10－229110

(22)出願日　平成10年８月13日(1998.8.13)

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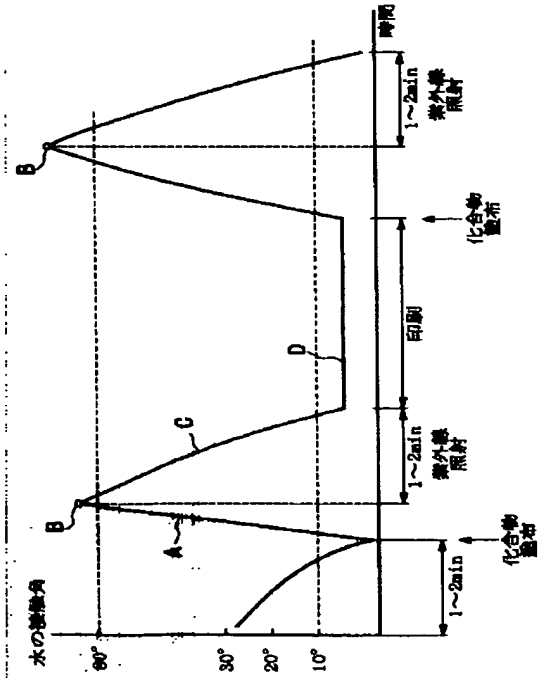
(54)【発明の名称】　印刷用版材及びその再生方法

(57)【要約】
【課題】　印刷工程のデジタル化に対応しつつ再利用が可能であるような印刷用版材及びその再生方法を提供する。
【解決手段】　印刷用版材として、基材上に酸化チタン光触媒を含むコート層を形成したものを利用する。版作製時の初期状態においては、版材表面が疎水性を示す状態に調整しておく。この調整とは、当該表面にオクタデシルトリメトシシラン等の化合物を塗布することにより行われる。この表面に、紫外線を照射し、表面の一部を親水性を示す表面に変換する。この変換は、印刷しようとする画像に準拠したデジタルデータに基づいて行われる。これにより、疎水性の部分を画線部、親水性の部分を非画線部として利用する。印刷が終了したら、前記化合物を再び塗布し、コート層表面が再び疎水性を示す版作製時の初期状態となるよう変換する。



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【特許請求の範囲】

【請求項1】　基材の表面に直接又は中間層を介して形成される酸化チタン光触媒を含むコート層と、該コート層上に前記酸化チタン光触媒のバンドギャップエネルギよりも高いエネルギをもつ波長の光を照射することで分解可能な化合物からなる塗布層とを備えていることを特徴とする印刷用版材。

【請求項2】　前記塗布層表面は、版作製時の初期状態において、水の接触角が少なくとも50°以上の疎水性を示すことを特徴とする請求項1記載の印刷用版材。

【請求項3】　前記塗布層表面に前記光を照射することにより、前記コート層表面を現出させると共に該コート層表面を水の接触角が10°以下となる親水性表面に変換することを特徴とする請求項1又は2記載の印刷用版材。

【請求項4】　版作製時の初期状態において、水の接触角が少なくとも50°以上の疎水性を示す前記塗布層表面に前記光を照射することにより、当該光の照射された領域において前記コート層表面を現出させるとともに該コート層表面を水の接触角が10°以下の親水性表面に変換し、当該親水性となる表面を非画線部、残る疎水性表面を画線部として利用することを特徴とする請求項1記載の印刷用版材。

【請求項5】　基材の表面に直接又は中間層を介して形成される酸化チタン光触媒を含むコート層と、該コート層上に前記酸化チタン光触媒のバンドギャップエネルギよりも高いエネルギをもつ波長の光を照射することで分解可能な化合物からなる塗布層とを備えている印刷用版材にあって、

印刷終了後、その面内において少なくとも一部が親水性を示す前記コート層表面を含む最外表面をクリーニングする工程と、その後前記塗布層を再形成し水の接触角が50°以上となる疎水性表面を現出させる工程と、さらにその後当該塗布層表面に前記光を照射する工程とを少なくとも含むことを特徴とする印刷用版材の再生方法。

【請求項6】　請求項5記載の印刷用版材の再生方法を、印刷機上で行うことを特徴とする印刷用版材の再生方法。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、印刷用版材及びその再生方法に関するものである。

【0002】

【従来の技術】印刷技術一般としては、昨今、印刷工程のデジタル化が進行しつつある。これは、スキャナ等で読み込んだ画像データを、パソコン等を介することによってデジタルデータ化し、このデータをそのまま利用することによって版を作製しようとする試みである。このことによって、印刷作業の省力化が図れると共に、高精細な印刷を行うことも可能となる。

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【0003】ところで、従来、印刷に用いる版材としては、いわゆるＰＳ版が一般的に知られている。これは、陽極酸化アルミニウムを親水性の非画線部とし、その表面上に感光性樹脂を硬化させて形成した疎水性の画線部を有するものとなっている。印刷は、上記疎水性の画線部に付着したインクが紙面上に転移することによって行われる。もっとも、このＰＳ版は、上記した印刷工程デジタル化に対応できるものとはなっていない。

【0004】一方で上記ＰＳ版の他、印刷工程のデジタル化に対応して、版の作製を容易にする方法も提案されている。例えば、ＰＥＴフィルム上に、カーボンブラック等のレーザ吸収層、さらにその上にシリコン樹脂層を塗布したものに、レーザ光線で画線を書き込むことによりレーザ吸収層を発熱させ、その熱によりシリコン樹脂層を焼きとばして版を作製する方法が知られている。また、アルミニウム版の上に親油性のレーザ吸収層を塗布し、さらにその上に塗布した親水層を前記と同様にレーザ光線で焼き飛ばして版とする方法等も知られている。

【0005】

【発明が解決しようとする課題】ところが、上記従来技術においては以下のような問題があった。まず、上記ＰＳ版においては、その作製に多くの時間とコストを必要とするため、特に少数部数の印刷においては印刷コストアップの要因となっていた。また、一つの絵柄の印刷が終わり次の印刷を行う際には、版の交換作業が必要となり、従前までに使用されていた版は廃棄処分となっていた。さらに、ＰＳ版は、上述したように、印刷工程のデジタル化に対応できるものとなっていない。すなわち、ＰＳ版では、デジタルデータから版を直接作製することができず、省力化や高精細印刷を実現するための印刷工程デジタル化を実現することが不可能であった。

【0006】また、上記デジタル化に対応した版の作製、すなわちＰＥＴフィルムを用いるものやアルミニウム版を用いるものは、確かにデジタルデータから直接版を作製することは可能であるが、一つの絵柄に関して印刷が終わると新しい版に交換しなければ印刷ができない。つまり、一度使った版が廃棄処分となる事情に関しては上記ＰＳ版と変わりはない。すなわち、その相応分印刷に係るコストが上昇することとなっていた。また、近年とみに提唱されるようになった地球環境保護という立場からも、一度使用した版を廃棄処分とするのは、好ましい状況といえるものではない。

【0007】本発明は上記事情に鑑みてなされたもので、その目的とするところは、印刷工程のデジタル化に対応しつつ再利用が可能であるような印刷用版材及びそれを用いた印刷機を提供することにある。

【0008】

【課題を解決するための手段】本発明は、上記の課題を解決するために以下の手段をとった。すなわち、請求項1記載の印刷用版材は、基材の表面に直接又は中間層を

介して形成される酸化チタン光触媒を含むコート層と、該コート層上に前記酸化チタン光触媒のバンドギャップエネルギよりも高いエネルギをもつ波長の光を照射することで分解可能な化合物からなる塗布層とを備えていることを特徴とするものである。

【0009】この印刷用版材の表面は、化合物及び酸化チタン光触媒の作用により、疎水性を示す部分と、親水性を示す部分とのそれぞれに領域を分けることが可能である。なお、親水性部分はコート層表面に光（一般には、紫外線）を照射することにより現出される。そして、当該親水性に変換された部分をインキの付着しない非画線部、残る疎水性部分をインキの付着する画線部として利用することにより、印刷用版材としての機能を発揮することが可能となる。また、基材と前記コート層との間に中間層を介した場合には、当該コート層の付着強度を十分に保つことが可能となる。

【0010】また、請求項2記載の印刷用版材は、前記塗布層表面が、版作製時の初期状態において、水の接触角が少なくとも50°以上の疎水性を示すことを特徴とする。

【0011】これによれば、版作製時の初期状態においては、版全面が画線部となり得る状態であるといえる。

【0012】また、請求項3記載の印刷用版材は、前記塗布層表面に前記光を照射することにより、前記コート層表面を現出させると共に該コート層表面を水の接触角が10°以下となる親水性表面に変換することを特徴とする。

【0013】これによれば、酸化チタン光触媒のバンドギャップエネルギより高いエネルギをもつ波長の光を照射したコート層表面が、親水性表面に変換されることから、その部分を非画線部として利用することが可能となる。ところで、この親水化処理においては、以下に示すような作用がえられることを示唆している。すなわち、前記酸化チタン光触媒による、その本来的な「触媒」作用により前記化合物の分解が促進されるという作用、及び酸化チタン光触媒表面自身が水の接触角が10°以下となる親水性表面となる作用である。したがって、この場合においては、前記親水化処理を速やかに完了し得ることが推測されることになる。また、この紫外線照射は、例えば、印刷しようとする画像に準拠したデジタルデータに基づいて行われるようにすることが可能であり、この場合、本発明による印刷用版材は、印刷工程のデジタル化に対応したものとなっているということがいえる。

【0014】また、請求項4記載の印刷用版材は、版作製時の初期状態において、水の接触角が少なくとも50°以上の疎水性を示す前記塗布層表面に前記光を照射することにより、当該光の照射された領域において前記コート層表面を現出させるとともに該コート層表面を水の接触角が10°以下の親水性表面に変換し、当該親水性となる表面を非画線部、残る疎水性表面を画線部として利用

することを特徴とするものである。

【0015】これは、上述した請求項2及び請求項3に記載した発明と同様な作用を有する印刷用版材であるということがいえる。したがって、この印刷用版材は、親水化処理において酸化チタン光「触媒」の本来的作用を生かすことが可能であると共に、印刷工程のデジタル化にも対応可能となっているものといえる。

【0016】また、請求項5記載の印刷用版材の再生方法は、基材の表面に直接又は中間層を介して形成される酸化チタン光触媒を含むコート層と、該コート層上に前記酸化チタン光触媒のバンドギャップエネルギよりも高いエネルギをもつ波長の光を照射することで分解可能な化合物からなる塗布層とを備えている印刷用版材にあって、印刷終了後、その面内において少なくとも一部が親水性を示す前記コート層表面を含む最外表面をクリーニングする工程と、その後前記塗布層を再形成し水の接触角が50°以上となる疎水性表面を現出させる工程と、さらにその後当該塗布層表面に前記光を照射する工程とを少なくとも含むことを特徴とするものである。

【0017】これによれば、化合物を塗布することにより、コート層表面は疎水性に変換されることになるから、このとき、この印刷用版材は請求項3に記載したものと同様なもの、すなわち、印刷用版材は初期状態になったとみなすことが可能である。また、このことはつまり、印刷用版材の再利用が可能となっていることを意味している。さらに、上記事実、すなわち疎水性への変換作業は実質的に化合物の塗布作業のみによるということから、当該作業は速やかに完了することが可能であるといえる。

【0018】また、請求項6記載の印刷用版材の再生方法は、請求項5記載の印刷用版材の再生方法を、印刷機上で行うことを特徴とする。

【0019】これによれば、実際に印刷を行う際において、前記疎水性への変換に係る作業時に一般に伴うと考えられる印刷作業の中断を挟むことなく、連続的な印刷作業を実施することが可能となる。

【0020】

【発明の実施の形態】以下では、本発明の実施の形態について、図を参照して説明する。図1は、本実施形態に係る印刷用版材の表面をも示す断面図を示している。図1において、基材1はアルミニウムで構成されている。なお、アルミニウムを印刷用版材として用いるのは極めて一般的な形態といえるが、ただし、本発明はこのことに限定されるものではない。

【0021】基材1表面上には、中間層2が形成されている。中間層2としては、例えば、シリカ（SiO_2）、シリコーン樹脂、シリコーンゴム等のシリコン系化合物がその材質として利用される。そのうち特に、シリコーン樹脂としては、シリコーンアルキド、シリコーンウレタン、シリコーンエポキシ、シリコーンアクリル、シリ

コーンポリエステル等が使用される。この中間層2は、前記基材1と後述するコート層3との付着を確実なものとならしめるため、また密着性を確保するために形成されているものである。すなわち、基材1と中間層2とを、またコート層3と中間層2とを、それぞれ確実に密着させることによって、結果、基材1とコート層3との付着強度を確保することとなっている。

【0022】中間層2上には、酸化チタン光触媒を含むコート層3が形成されている。このコート層3表面においては、版作製時の初期状態に疎水性を示し、紫外線を照射することによって親水性を示す部分を現出させることが可能となっている。この性質は、前記酸化チタン光触媒の備える性質に依るものである。なお、このことについては後に詳しく説明することとする。

【0023】このコート層3には、前記性質、すなわち疎水性から親水性への変換特性を改良するため、あるいは当該コート層3の強度や基材1との密着性を向上させることを目的として、次に示すような物質を添加したものとしてよい。この物質とは、例えば、シリカ、シリカゾル、オルガノシラン、シリコン樹脂等のシリカ系化合物、また、ジルコニウム、アルミニウム等からなる金属酸化物又は金属水酸化物、さらにはフッ素系樹脂を挙げることができる。なお、酸化チタン光触媒の強い酸化力を考慮すると、コート層3の組成は無機化合物の方が、コート層3の劣化を防ぐという観点から好ましいものといえる。

【0024】また、酸化チタン光触媒そのものとしては、結晶構造がそれぞれ異なるアナターゼ型とルチル型とがあり、本実施形態においては両者とも利用可能であるが、一般的には光触媒作用が高いアナターゼ型の方が好ましい。また、版面に書き込む画像の解像度を高めて高精細印刷を可能とするため、及び薄い膜厚となるコート層3を形成することも視野内に収めることを可能とするため、酸化チタン光触媒の粒径は0.1μm以下であることが好ましい。

【0025】なお、使用する酸化チタン光触媒としては、市販されていて、かつ本実施形態において使用可能なものを具体的に列挙すれば、石原産業製のＳＴ-01、ＳＴ-21、その加工品ＳＴ-K01、ＳＴ-K03、水分散タイプＳＴＳ-01、ＳＴＳ-02、ＳＴＳ-21、また、堺化学工業製のＳＳＰ-25、ＳＳＰ-20、ＳＳＰ-M、ＣＳＢ、ＣＳＢ-M、塗料タイプのＬＡＣＴＩ-01、テイカ製のＡＴＭ-100、ＡＴＭ-600、ＳＴ-157等を挙げることができる。ただし、本発明はこれらの酸化チタン光触媒以外にあっても適用可能なことはもちろんである。

【0026】また、コート層3の膜厚は、0.01～10μmの範囲内にあることが好ましい。というのは、膜厚があまりに小さければ、前記した性質を十分に生かすことが困難となるし、また、膜厚があまりに大きければ、コート層3がヒビ割れしやすくなり、耐刷性低下の要因となるためである。なお、このヒビ割れは、膜厚が50μmを越えるようなときに顕著に観察されるから、前記範囲を緩和するとしても当該50μmをその上限として認識する必要がある。また、実際上は2～3μm程度の膜厚となるのが一般的な形態であるといえる。

【0027】さらに、このコート層3の形成方法としては、ゾル塗布法、有機チタネート法、蒸着法等を適宜選択して形成すればよい。このとき例えば、塗布法を採用するのであれば、それに用いられる塗布液には、酸化チタン光触媒及び前記コート層3の強度や基材1との密着性を向上させる前記各種の物質の他に、溶剤、架橋剤、界面活性剤等を添加しても良い。また塗布液は、常温乾燥タイプでも加熱乾燥タイプでも良いが、後者の方を作用する方がより好ましい。というのは、加熱によりコート層3の強度を高めた方が、版の耐刷性を向上させるのに有利となるからである。

【0028】コート層3上には、酸化チタン光触媒のバンドギャップエネルギよりも高いエネルギをもつ波長の光を照射することで分解可能な化合物からなる塗布層4が形成されている。この塗布層4表面は、図1に示すように、水の接触角が少なくとも50°以上の疎水性を示すようになっている。ちなみに、接触角が80°以上となるようにすればより好ましい状態であるといえる。この状態においては、図1からも察することが可能なように、水が塗布層4表面に付着することが困難、すなわちいわゆる撥水性が極めて高い状態となっているから、逆に言えば印刷用インキが塗布層4表面上に付着することが容易な状態が現出されているといえる。

【0029】以下では、上記構成となる印刷用版材に関する作用及び効果について説明する。まず、印刷用版材作製時の初期状態においては、前記コート層3表面を、図1に示すように、水の接触角が少なくとも50°以上の疎水性を示すように調整しておく。ここでいう「版作製時の初期状態」及び「疎水性を示すように調整」するということは、具体的には以下のうな事情を指す。まず、「疎水性を示すように調整」するとは、コート層3表面に紫外線照射により分解可能な化合物からなる塗布層4を形成し、かつそれを乾燥させることによって行われる。なお、この塗布には、スプレーコーティング、ブレードコーティング、ディプコーティング、ロールコーティング等の方法を適宜採用すればよい。また、乾燥は、常温又は加熱のいずれによる方法であっても良い。そして、これら「調整」によりコート層3表面が疎水性となったときを指して、「版作製時の初期状態」である旨規定するものである。

【0030】上記化合物としては、前記表面に疎水性を付与する作用を有することはもちろん、それとともに紫外線照射によって「容易に」酸化分解反応されるものが好ましい。具体的には、

① トリメチルメトキシシラン、トリメチルエトキシシ

ラン、ジメチルジエトキシシラン、メチルトリメトキシシラン、テトラメトキシシラン、メチルトリエトキシシラン、テトラエトキシシラン、メチルジメトキシシラン、オクタデシルトリメトキシシラン、オクタデシルトリエトキシシラン等のアルコキキシラン

② トリメチルクロロシラン、ジメチルジクロロシラン、メチルトリクロロシラン、メチルジクロロシラン、ジメチルクロロシラン等のクロロシラン

③ ビニルトリクロロシラン、ビニルトリエトキシシラン、γ-クロロプロピルトリメトキシシラン、γ-クロロプロピルメチルジクロロシラン、γ-クロロプロピルメチルジメトキシシラン、γ-クロロプロピルメチルジエトキシシラン、γ-アミノプロピルトリエトキシシラン等のラカンカップリング剤

④ ヘキサメチルジシラザン、N，N'-ビス（トリメチルシリル）ウレア、N-トリメチルシリルアセトアミド、ジメチルトリメチルシリルアミン、ジエチルトリメチルシリルアミン等のシラザン

⑤ パーフロロアルキルトリメトキシシラン等のフロロアルキルシラン

⑥ ジメチルハイドロジェンポリシロキサン タイプのシリコンオイル

⑦ ラウリン酸、ミリスチン酸、パルチミン酸、ステアリン酸、オレイン酸等の脂肪酸等が挙げられる。ただし、本発明はこれらの化合物のみに限られるものでないことは言うまでもない。さらに、これらの化合物は必要に応じて溶剤で希釈して使用してももちろん良い。

【００３１】なお、上記でいう「版作製時の初期状態」ということを、より一般的に言えば、実際上の印刷工程におけるその開始時とみなしてよい。つまり、ある与えられた任意の画像に関して、それをデジタル化したデータが既に用意されていて、これを版材上に転写しようとするときの状態を指すものとみなせる。ただし、このデジタル化データが用意される段階が、後述するコート層３表面に関する親水化処理を施した後であってもよく、いま述べたことは厳密に解されるべきではない。つまり、「版作製時の初期状態」を、上記のように「実際上の印刷工程開始時」と定義するときには、それを広義に解釈するものとする。

【００３２】次に、上記状態となる塗布層４表面に対して、図２に示すような紫外線照射を実施する。この紫外線照射は、前記した画像に関するデジタルデータに準拠して、そのデータに対応するように行われる。なお、ここでいう紫外線とは、酸化チタン光触媒のバンドギャップエネルギより高いエネルギをもつ波長の光のことである。より具体的には、波長４００nm以下の光を含む紫外線である。

【００３３】この紫外線照射によって、同じく図２に示すように、塗布層４を構成する前記化合物が分解されることで、そのコート層３表面が現出すると共に当該表面が親水性を示すように変換される。これは酸化チタン光触媒の作用によるものである。なお、化合物の分解は、酸化チタン光「触媒」としての本来的な作用により進行するため、極めて速やかに完了することとなる。これらのことによって、コート層３表面における紫外線が照射された領域は、水の接触角が10°以下の状態となる。この状態は、先の塗布層４における疎水性表面の状態とちょうど逆の関係となるものである。すなわち、水は殆ど膜状にコート層３表面に広がることとなるが、印刷用インキはこの表面に付着することが不可能となる。

【００３４】ちなみに、酸化チタン光触媒が、紫外線照射によって親水化する機構に関しては、概ね次のように言われている。酸化チタン光触媒が非親水性となるときには、図３左方に示すように、表面において酸素がブリッジされた状態となっている。このため水分子が表面に付着することがなく、結果疎水性を発揮することになる。一方、これに紫外線を照射すると、先の酸素のブリッジ状態が解かれ、図３右方に示すように、水酸基が表面上にあらわれる。そして、この水酸基が、表面上に存在する水を吸着して親水性を発揮することになる。なお、この水酸基が表面上に露出した形態は、放置しておけば自然に元の疎水性表面へと移行しようとする。つまり、酸素がブリッジされた状態の方が、化学的には安定であるといえる。

【００３５】上記までの処理が終了したら、塗布層４あるいは親水化処理されたコート層３表面に印刷用インキを塗布する。すると、例えば図４に示すような印刷用版材が作製されることになる。この図において、ハッチングされた部分が上記親水化処理のなされなかった部分、すなわち疎水性部分又は塗布層４が残存する部分であり、したがって、印刷用インキが付着した画線部を示しており、一方の地の部分、すなわち親水性部分又はコート層３表面部分は印刷用インキがはじかれて、その付着がなされなかった非画線部を示している。このように絵柄が浮かび上がることにより、この印刷用版材は、親版としての作用を有することになる。

【００３６】この後、通常の印刷工程を実行しこれを終了させる。そして、この印刷を終えた印刷用版材に対しては、再び上述したような化合物からなる塗布層４の形成を行う。したがって、印刷用版材は、この塗布を終えた段階で再び「版作製時の初期状態」に復帰していることになる。つまり、このときコート層３表面上には、印刷用インキの付着が全面に付着可能な塗布層４が形成され疎水性を示していることとなり、この表面に再び紫外線照射を行えば印刷用の新たな親版を作製することが可能となる。端的に言えば、本実施形態における印刷用版材は、その再利用が、言い換えれば繰り返し利用が可能なものとなっているものである。

【００３７】以上説明したことを、まとめて示しているのが図５に示すグラフである。これは、横軸に時間、縦

軸に水の接触角をとったグラフであって、本実施形態における印刷用版材に関して、その表面の水の接触角（すなわち、疎水、親水状態）が時間と共にどのように遷移するかを示したものである。なお、この図は、酸化チタン光触媒単独では疎水性に係る性能が十分ではない（紫外線照射前の水の接触角が50°以上とならない）が、疎水性から親水性への変換が速やかに完了する能力を備えた酸化チタン光触媒を利用した場合について示したものとなっている。

【００３８】これによれば、まず、当初のコート層３表面においては、上記に述べたように、水の接触角が20～30°であって疎水性能が十分でない。したがって、このままでは画線部として用いるには不十分であり、印刷用版材としてこれを利用することができない。ただし、この酸化チタン光触媒は、図に示すように、紫外線を照射すると速やかに親水性表面へと変換する能力を備えている。通常にあっては、この変換は10min程度かかるのが一般的であるが、この例においては１～２minでそれが完了していることがわかる。

【００３９】次に、コート層３表面に化合物を塗布する、すなわち塗布層４を形成することによって、版材の疎水性は、図５中曲線Ａに示すように十分な状態となる。すなわち、インキの付着が可能となって印刷の使用に供することが可能な状態となる。また、これがつまり「版作製時の初期状態」（図５中点Ｂ）である。なお、この「版作製時の初期状態」を現出するためには、上記したように実質的に化合物を塗布するのみでよいから、極めて短時間のうちにこれを完了できることは明らかである。

【００４０】この後、紫外線照射を行い、前記化合物を分解すると共に、コート層３表面の少なくとも一部を親水性部分として変換する。なおこの場合において、疎水性から親水性への変換速度が大きい上記のような酸化チタン光触媒を用いていること、また、化合物の分解が先に述べたように酸化チタン光「触媒」の本来的な作用により速やかに完了すること、の両作用によって、この酸化チタン光触媒における疎水性から親水性への変換は、図５中曲線Ｃに示すように、１～２minで完了することが可能となっている。

【００４１】上記処理が施された印刷用版材には印刷用インキが付着され、図５中直線Ｄに示すように、実際の印刷が行われることになる。以下、印刷が終了すると、印刷用版材には、化合物の塗布、紫外線照射等の処理が上記同様に施されて再利用に供されることになる。

【００４２】いま述べたように、本実施形態における印刷用版材は、再利用が可能となっているという利点もさることながら、そのサイクルを迅速化できる利点をも備えている。すなわち、上記によれば、疎水性を付与するにも、親水性を付与するにも、いずれにしても、それらを実現するための作業に時間がかからないこととなっている。したがって、印刷工程全体を極めて速やかに完了することが可能なものとなっている。

【００４３】以下では、印刷用版材の作製及び印刷に係る、本願発明者らが確認したより具体的な実施例について説明する。まず、その面積が葉書サイズ、厚さが0.3mmのアルミニウム製の基材を用意し、これに堺化学工業製プライマーＬＡＣ PR-01を塗布、乾燥させた。乾燥後のプライマーの厚みは1.4μmであった。なお、このプライマー層とは、図１における中間層２に対応していることになる。その後、石原産業性の酸化チタン光触媒コーティング剤ＳＴ-K03を塗布し150℃で乾燥させて、厚み0.8μmのコート層３を成膜した。さらに、このコート層３表面に、東芝シリコーン製のオクタデシルトリメトキシシラン（商品名TSL8185）をエタノールにて３wt%濃度に希釈して５分間ゆっくり撹拌し、さらにこの溶液に対して酢酸を2000ppm添加し再度５分間ゆっくり撹拌して疎水化処理液としたものを、ロールコーティングにより塗布した。そしてこれを120℃で乾燥させて、上記までに何度か説明した「版作製時の初期状態」を現出させた。

【００４４】上記疎水化処理液（すなわち、オクタデシルトリメトキシシラン）を塗布した版材について、その版材表面のほぼ中央部を一辺が２cmの正方形の黒い紙でマスキングし、マスキングしていない部分に照度40mW/cm²の紫外線を「２分間」照射した後、紫外線照射部分について直ちに協和界面化学製のＣＡ-W型接触角計を用いて水の接触角を測定したところ、接触角は「０～２°」となり、非画線部として十分な親水性を示した。

【００４５】この版材をSAN PRINTING MACHINRS社製のSAN OFF-SET 220E DX型カード印刷機に取り付け、東洋インキ製のインキHYECOO B紅ＭＺと三菱重工業製の湿し水リソフェロー１%溶液を用いて、アイベスト紙に印刷速度2500枚／時にて印刷を行った。その結果、紫外線を照射した部分の版面にはインキが付着せず、マスキングした版材部分に相当する一辺が２cmの正方形の紅色画像を紙面上に印刷できた。

【００４６】また、これに続いて、印刷を終了した上記印刷用版材に対して、上述したと同様な方法により疎水化処理液を塗布しこれを乾燥させ、さらに版材表面中央部に直径が２cmの円形の黒いマスキングをして照度40mW/cm²の紫外線を２分間照射したものを試作した。これはすなわち、印刷用版材の再利用を図る際に実施される処理となる。これによっても、紫外線照射部分における水の接触角は０～２°となり、非画線部として十分な親水性を示すと共に、実際の印刷においてもマスキングした版材部分に相当する直径が２cmの円形の紅色画像を紙面上に印刷することができた。

【００４７】次に、カード印刷機に版を取り付けた状態で、版面上に付着したインキと湿し水をふき取り、ロールコーティングにより前記疎水化処理液を塗布した後、

120℃の熱風で乾燥させて、版材表面を疎水化した。この疎水化処理した版のほぼ中央部を一辺が2cmの正三角形の黒い紙でマスキングし、マスキングしていない部分に照度40mW/cm²の紫外線を10分間照射した。この版材を上述したのと同様にして印刷をおこなったところ、紫外線を照射した部分の版面にはインキが付着せず、マスキングした版材部分に相当する一辺が2cmの正三角形の紅色画像が紙面上に印刷できた。

【0048】なお、上記印刷は、図6に示すような印刷機10を用いて行った。すなわち、この印刷機10は、版胴11を中心として、その周囲にコーティング装置12、ブラン胴13、版クリーニング装置14、書き込み装置15、インキングローラ16、及び乾燥装置17を備えたものとなっている。印刷用版材は、版胴11に巻き付けられて設置されている。

【0049】この印刷機10において、上記したように印刷を終了した版を再利用に供する実際の工程は、次のように行われる。まず、版クリーニング装置14を版胴11に対して接した状態とし、版材の最外表面、すなわち版面上に付着したインキと湿し水をふき取る。その後、版クリーニング装置14を版胴11から離脱させ、コーティング装置12を版胴11に接した状態とする。このことによって、前記疎水化処理液が版材上に塗布されていく。この後、コーティング装置12を版胴11から離脱させて乾燥装置17を稼働させ、疎水化処理液の乾燥を行う。次に、予め用意された画像のデジタルデータに基づき、書き込み装置15の発する紫外線によってその疎水化された版材表面に画像を書き込む。以上の工程が終了したら、インキングローラ16、ブラン胴13を版胴11に対して接する状態とする。そして、紙18がブラン胴13に接するよう、かつ図6に示す矢印の方向に流れていくことによって、連続的な印刷が行われるようになっている。

【0050】以上説明したように、本実施形態における印刷用版材は、酸化チタン光触媒のもつ性質、すなわち疎水性から親水性への変換性質を利用することにより、その再利用を可能とし、使用後に廃棄される版材の量を著しく減少させることができる。したがって、その分、版材に関わるコストを大幅に低減することができる。また、画像に係るデジタルデータから、版材への画像書き込みは、光（紫外線）によって直接実施することが可能であることから、印刷工程のデジタル化対応が成されており、その相応分の大幅な時間短縮、またコスト削減を図ることができる。

【0051】また、上でも触れたように、化合物からなる塗布層4を形成して、印刷用版材を再利用を図る本実施形態の場合においては、印刷工程全体の迅速化が図れることになる。このことには、当該化合物の分解が、酸化チタン光「触媒」の本来的な作用により促進されて速やかに完了する事実が大きく寄与する。さらに、そもそも疎水性から親水性への変換速度が大きい酸化チタン光触媒を利用すれば、なお一層の迅速化に大きく貢献することとなる。

【0052】さらに、印刷用版材の再利用を図る処理は、これを印刷機上で行うことが可能となっているから、印刷作業の迅速化を実現することができる。なお、上記の例では、塗布層4面に対する画像書き込みも印刷機上で行われていたから、より迅速な作業を実施することができる。

【0053】なお、本実施形態においては、基材1とコート層3との間に中間層2を設けることとしていたが、本発明はこのことに限定されるものではない。すなわち、中間層2は必ずしも設ける必要はない。なお、このように言えるのは、仮に中間層2を設けないとしても、上までの説明から明らかなように、本発明の主要な本質が損なわれることにならないからである。

【0054】

【発明の効果】以上説明したように、請求項1記載の印刷用版材は、基材の表面に酸化チタン光触媒を含むコート層及び該コート層上に塗布層とを形成することにより、その表面において、酸化チタン光触媒のバンドギャップエネルギよりも高いエネルギをもつ波長の光を照射することにより、疎水性から親水性への変換を行うことが可能となっている。したがって、疎水性部分を画線部、親水性部分を非画線部として利用することにより、印刷用版材としての機能を発揮することが可能となるものである。なお、このとき基材とコート層との間に、中間層を設けることにより両者の付着強度を十分とすることができる。また前記化合物は、前記コート層に疎水性を付与するものとしては適した化合物であるとともに、前記光の照射によって比較的容易に酸化分解反応が進行する物質である。したがって、上記した疎水性表面から親水性表面への変換を速やかに完了することができる。

【0055】また、請求項2記載の印刷用版材は、前記塗布層表面が、版作製時の初期状態において、水の接触角が少なくとも50°以上の疎水性を示すことから、当該初期状態では、版全面が画線部となり得る状態となっていると言える。逆に言えば、この塗布層表面に対して画像を做うような紫外線照射を行えば、当該画像を浮かび上がらせることが可能となり、これを親版として利用することができる。

【0056】また、請求項3記載の印刷用版材は、前記塗布層表面に前記光を照射することにより、その部分を非画線部として利用することが可能となる。なおこのとき、前記塗布層は、この親水化処理時において、酸化チタン光触媒の本来的な「触媒」作用を受けて速やかに分解されることになる。したがって、本発明によれば、印刷用版材の作製工程の迅速化、ひいては印刷工程の迅速化を図ることができるものであるといえる。また、前記光の照射は、印刷用しようとする画像に準拠したデジタ

ルデータに基づいて行われるようにすることが可能である。したがって、本発明による印刷用版材は印刷工程のデジタル化に対応したものであるといえ、それ故、印刷時間の大幅な短縮、そしてコスト削減を図ることができる。

【００５７】また、請求項４記載の印刷用版材は、上述した請求項２及び請求項３に記載した発明の組み合わせ的な作用を有すると言える。したがって、この印刷用版材は、親水化処理において酸化チタン光「触媒」の本来的作用を生かすことが可能で、作業の迅速化が図れると共に、印刷工程のデジタル化に対応することが可能なものとなっており上記と同様印刷時間の大幅な短縮及びコスト削減を図ることができる。

【００５８】また、請求項５記載の印刷用版材の再生方法は、その面内において少なくとも一部が親水性を示す前記コート層表面に、化合物を塗布することにより、当該表面を疎水性に変換することから、印刷用版材の再利用が可能なものとなる。したがって、従来の印刷用版材のように、印刷終了と共に廃棄処分とする必要がなく、その相応分コスト削減を図ることができる。また、上記事実、すなわち疎水性への変換作業は実質的に化合物の塗布作業のみによるということから、当該作業は速やかに完了させることができる。

【００５９】また、請求項６記載の印刷用版材の再生方

法は、前記疎水性への変換に係る作業を印刷機上で行うことから、その作業時に一般に伴うと考えられる印刷作業の中断を挟むことがない。したがって、連続的な印刷作業を実施することができ、印刷作業の迅速化が図れることになる。なお、本発明においては、版の再利用に係るメリットも同時に享受できることは言うまでもない。

【図面の簡単な説明】

【図１】　印刷用版材の構成を示す断面図である。また、この図は、コート層表面が疎水性を示している状態をも同時に示している。

【図２】　コート層表面が親水性を示している状態を示す印刷用版材の断面図である。

【図３】　酸化チタン光触媒における疎水性から親水性への変換を説明する説明図である。

【図４】　コート層表面に描かれた画像（画線部）とその地（非画線部）の一例を示す斜視図である。

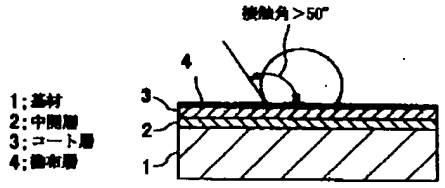
【図５】　コート層表面の疎水性から親水性への変換の様子を時間に沿って示したグラフである。

【図６】　印刷機の構成の一例を示す説明図である。

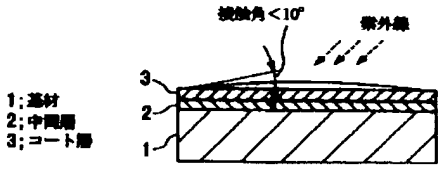
【符号の説明】

１　基材
２　中間層
３　コート層
１０　印刷機

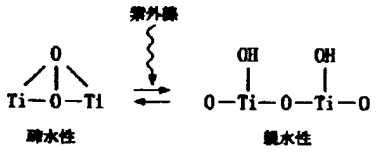
【図1】



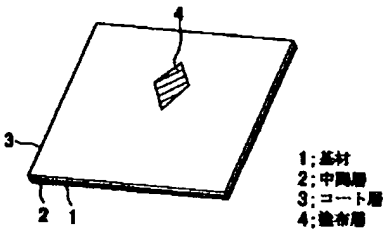
【図2】



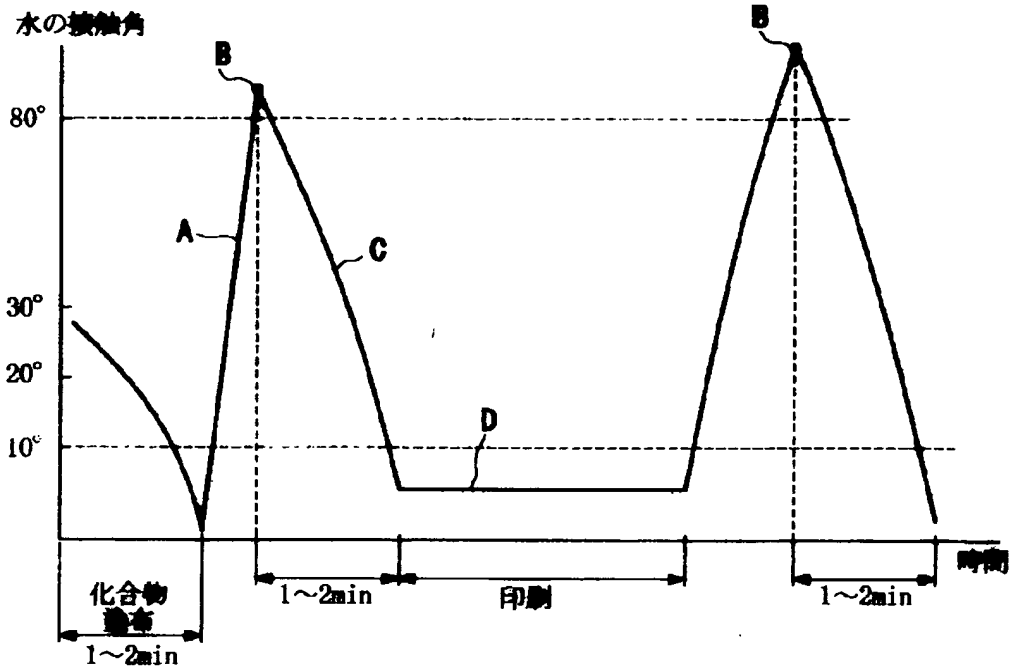
【図3】



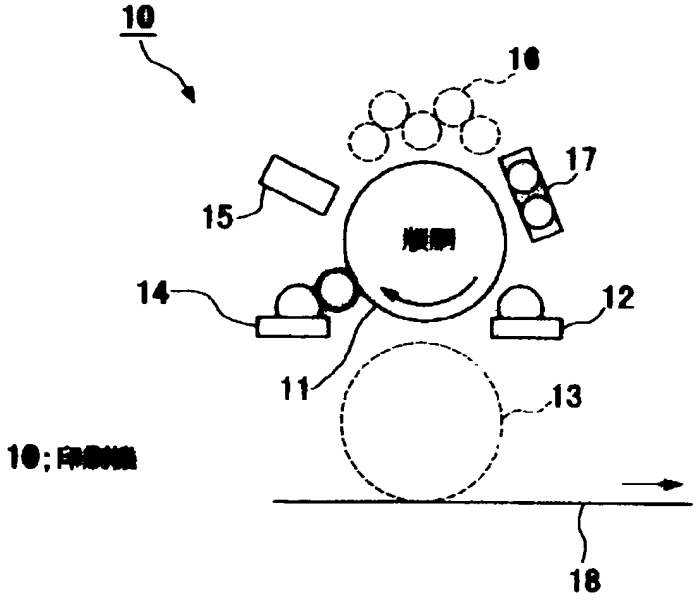
【図4】



【図5】


水の接触角
80°
30°
20°
10°
A
B
B
C
D
時間
化合物
塗布
1～2min
1～2min
印刷
1～2min

【図6】


10
16
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現像
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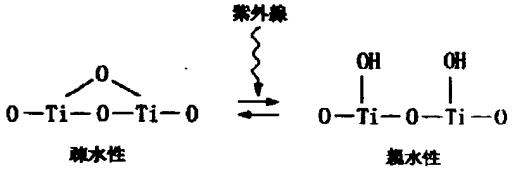
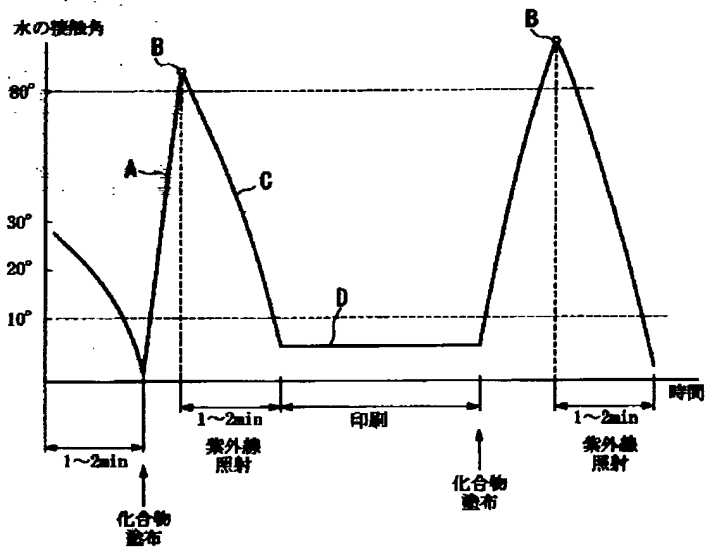
【手続補正書】
【提出日】平成１１年4月5日（１９９９．４．５）
【手続補正１】
【補正対象書類名】明細書
【補正対象項目名】００２９
【補正方法】変更
【補正内容】
【００２９】以下では、上記構成となる印刷用版材に関する作用及び効果について説明する。　まず、印刷用版材作製時の初期状態においては、前記コート層３表面を、図１に示すように、水の接触角が少なくとも50°以上の疎水性を示すように調整しておく。ここでいう「版作製時の初期状態」及び「疎水性を示すように調整」するということは、具体的には以下のような事情を指す。まず、「疎水性を示すように調整」するとは、コート層３表面に紫外線照射により分解可能な化合物からなる塗布層４を形成し、かつそれを乾燥させることによって行われる。なお、この塗布には、スプレーコーティング、ブレードコーティング、ディプコーティング、ロールコーティング等の方法を適宜採用すればよい。また、乾燥は、常温又は加熱のいずれによる方法であっても良い。そして、これら「調整」によりコート層３表面が疎水性となったときを指して、「版作製時の初期状態」である旨規定するものである。
【手続補正２】
【補正対象書類名】明細書
【補正対象項目名】００３１
【補正方法】変更
【補正内容】
【００３１】なお、上記でいう「版作製時の初期状態」ということを、より一般的にいえば、実際上の印刷工程におけるその開始時とみなしてよい。つまり、ある与えられた任意の画像に関して、それをデジタル化したデータが既に用意されていて、これを版材上に書き込みしようとするときの状態を指すものとみなせる。ただし、このデジタル化データが用意される段階が、後述するコート層３表面に関する親水化処理を施した後であってもよく、いま述べたことは厳密に解されるべきではない。つまり、「版作製時の初期状態」を、上記のように「実際上の印刷工程開始時」と定義するときには、それを広義に解釈するものとする。
【手続補正３】
【補正対象書類名】明細書
【補正対象項目名】００３５
【補正方法】変更
【補正内容】
【００３５】上記までの処理が終了したら、塗布層４あるいは親水化処理されたコート層３表面に印刷用インキを塗布する。すると、例えば図４に示すような印刷用版材が作製されることになる。この図において、ハッチングされた部分が上記親水化処理のなされなかった部分、すなわち疎水性部分又は塗布層４が残存する部分であり、したがって、印刷用インキが付着した画線部を示しており、一方の白地の部分、すなわち親水性部分又はコート層３表面部分は印刷用インキがはじかれて、その付着がなされなかった非画線部を示している。このように絵柄が浮かび上がることにより、この印刷用版材は親版としての作用を有することになる。
【手続補正４】
【補正対象書類名】明細書
【補正対象項目名】００３９
【補正方法】変更
【補正内容】
【００３９】次に、コート層３表面に化合物を塗布する、すなわち塗布層４を形成することによって、版材の疎水性は、図５中曲線Ａを経て点Ｂに示すように十分な状態となる。すなわち、インキの付着が可能となって印刷の使用に供することが可能な状態となる。また、これがつまり「版作製時の初期状態」（図５中点Ｂ）である。なお、この「版作製時の初期状態」を現出するためには、上記したように実質的に化合物を塗布するのみでよいから、極めて短時間のうちにこれを完了できることは明らかである。
【手続補正５】
【補正対象書類名】明細書
【補正対象項目名】００４４
【補正方法】変更
【補正内容】
【００４４】上記疎水化処理液（すなわち、オクタデシルトリメトキシシラン）を塗布した版材について、その版材表面のほぼ中央部を一辺が２cmの正方形の黒い紙でマスキングし、マスキングしていない部分に照度40mW/cm²の紫外線を「２分間」照射した後、マスキング部分と紫外線照射部分について直ちに協和界面化学製のＣＡ－Ｗ型接触角計を用いて水の接触角を測定したところ、これら両部分の接触角はそれぞれ８０°以上、０～２°となり、マスキング部分は画線部としての十分な疎水性、紫外線照射部分は非画線部としての十分な親水性を示した。
【手続補正６】
【補正対象書類名】明細書
【補正対象項目名】図面の簡単な説明
【補正方法】変更
【補正内容】
【図面の簡単な説明】
【図１】　印刷用版材の構成を示す断面図である。また、この図は、コート層表面が疎水性を示している状態をも同時に示している。
【図２】　コート層表面が親水性を示している状態を示

す印刷用版材の断面図である。
【図３】　酸化チタン光触媒における疎水性から親水性への変換を説明する説明図である。
【図４】　コート層表面に描かれた画像（画線部）とその白地（非画線部）の一例を示す斜視図である。
【図５】　コート層表面の疎水性から親水性への変換の様子を時間に沿って示したグラフである。
【図６】　印刷機の構成の一例を示す説明図である。
【符号の説明】
１　基材
２　中間層
３　コート層
１０　印刷機
【手続補正７】
【補正対象書類名】図面
【補正対象項目名】図３
【補正方法】変更
【補正内容】
【図３】



【手続補正８】
【補正対象書類名】図面
【補正対象項目名】図５
【補正方法】変更
【補正内容】
【図５】



フロントページの続き

Ｆターム(参考)　2H025 AB01 AC01 AD03 BH01 BH03
BJ00 DA40 FA39
2H096 AA01 BA20 CA05 EA02 HA30
2H114 AA04 AA15 AA22 AA27 AA28
BA01 DA05 DA08 DA15 DA49
DA62 DA73 EA01 EA03 EA06
FA14 FA15 FA16 GA03
4G069 AA03 AA15 BA04A BA04B
BA48A BA48C BB04A CD10
EA07

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2000-062335
(43)Date of publication of application : 29.02.2000

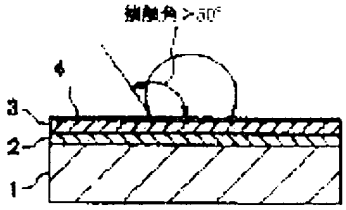
(51)Int.CI. B41N 1/08
B01J 35/02
G03F 7/00
G03F 7/004

(21)Application number : 10-229110
(22)Date of filing : 13.08.1998

(71)Applicant : MITSUBISHI HEAVY IND LTD
(72)Inventor : SUDA YASUHARU

(54) PRINTING PLATE MATERIAL AND RECLAMING METHOD THEREOF

(57)Abstract:
PROBLEM TO BE SOLVED: To digitize a printing process and make the reuse of a material possible by a method wherein a coating layer including a titanium oxide photocatalyst is formed on the surface of a base material and a painting layer made of a compound, which can be dissolved through the irradiation of the light having an energy higher than the band gap energy of the titanium oxide photocatalyst, is equipped on the coating layer.
SOLUTION: On the surface of a base material 1, a coating layer 3 including a titanium oxide photocatalyst is formed. A painting layer 4 made of a compound, winch can be decomposed through the irradiation of the light with the wavelength having an energy higher than the band gap energy of the titanium oxide photocatalyst, is formed on the coating layer 3. At the production of a printing plate material, at the early state, the surface of the coating layer 3 is prepared so as to be hydrophobic. By irradiating ultraiolet rays based on the digital data on an image over the resultant surface of the coating layer 3, the surface of the coating layer 3 is converted to be hydrophilic. Since writing of the image is directly executed with a light as mentioned above, the digitization of the printing plate material can be coped with. Further, since the converting properties of the titanium oxide photocatalyst from its hydrophobic properties to its hydrophilic properties, the reuse of the printing plate material can become possible.



LEGAL STATUS

[Date of request for examination] 06.06.2001

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

* NOTICES *

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1. This document has been translated by computer.So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] The plate for printing characterized by having the application layer which consists of a compound which can be disassembled by irradiating the light of the wavelength which has energy higher than the bandgap energy of the aforementioned titanium oxide photocatalyst on the coat layer containing the titanium oxide photocatalyst formed through direct or an interlayer on the surface of a base material, and this coat layer.
[Claim 2] The aforementioned application layer front face is a plate for printing according to claim 1 characterized by the contact angle of water showing hydrophobic property at least 50 degrees or more in the initial state at the time of version production.
[Claim 3] The plate for printing according to claim 1 or 2 characterized by changing this coat layer front face into the hydrophilic front face on which the contact angle of water becomes 10 degrees or less while making the aforementioned application layer front face appear the aforementioned coat layer front face by irradiating the aforementioned light.
[Claim 4] When the contact angle of water irradiates the aforementioned light in the initial state at the time of version production on the aforementioned application layer front face which shows hydrophobic property at least 50 degrees or more The plate for printing according to claim 1 which the contact angle of water changes this coat layer front face into a hydrophilic front face 10 degrees or less while making the aforementioned coat layer front face appear in the field to which the light concerned was irradiated, and is characterized by using the non-streak section and the hydrophobic front face which remains for the front face concerned which becomes hydrophilic as the streak section.
[Claim 5] The coat layer containing the titanium oxide photocatalyst formed through direct or an interlayer on the surface of a base material, It is in the plate for printing equipped with the application layer which consists of a compound which can be disassembled by irradiating the light of the wavelength which has energy higher than the bandgap energy of the aforementioned titanium oxide photocatalyst on this coat layer. The process which cleans the outermost front face including the aforementioned coat layer front face where at least a part shows a hydrophilic property after a printing end and in the field, The reproduction method of the plate for printing characterized by including at least the process which makes the hydrophobic front face where the account application layer of back to front is re-formed, and the contact angle of water becomes 50 degrees or more appear, and the process which irradiates the aforementioned light on the application layer front face concerned after that further.
[Claim 6] The reproduction method of the plate for printing characterized by performing the reproduction method of the plate for printing according to claim 5 on a printing machine.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] this invention relates to the plate for printing, and its reproduction method.
[0002]
[Description of the Prior Art] Digitization of presswork is advancing as general printing technology these days. This is the attempt which is going to produce a version by digital-data-izing and using this data as it is by minding the image data read with the scanner etc. for a personal computer etc. While being able to attain laborsaving of printing work by this, it also becomes possible to perform high definition printing.
[0003] By the way, generally the so-called PS plate is conventionally known as a plate used for printing. This makes anodic oxidation aluminum the non-streak section of a hydrophilic property, and has the hydrophobic streak section which was made to harden a photopolymer and was formed on the front face. Printing is performed when the ink adhering to the streak section of the above-mentioned hydrophobic property transfers on space. But this PS plate cannot respond to the above-mentioned presswork digitization.
[0004] On the other hand, corresponding to digitization of presswork besides the above-mentioned PS plate, the method of making production of a version easy is also proposed. For example, by writing in laser absorption layers, such as carbon black, on a PET film, and writing in a streak in what applied the silicon resin layer on it further by the laser beam, a laser absorption layer is made to generate heat and the method of burning a silicon resin layer off with the heat, and producing a version is learned. Moreover, how to burn off like the above the hydrophilic layer which applied the laser absorption layer of lipophilic property on the aluminum version, and was further applied on it by the laser beam, and use as a version etc. is learned.
[0005]
[Problem(s) to be Solved by the Invention] However, there were the following problems in the above-mentioned conventional technology. First, in the above-mentioned PS plate, since much time and cost were needed for the production, in printing of a small number of number of copies, it had become the factor of a printing cost rise. Moreover, when printing of one pattern finished and the next printing was performed, the exchange work of a version was needed and the version currently used by old had become a disposal. Furthermore, the PS plate cannot respond to digitization of presswork, as mentioned above. That is, in the PS plate, it was impossible to have realized presswork digitization for being unable to produce a version directly from digital data, but realizing laborsaving and highly minute printing.
[0006] Moreover, although it is possible surely to produce the direct version from digital data, if the thing using the thing or the aluminum version using production of the version corresponding to the above-mentioned digitization, i.e., a PET film, is not exchanged for a new version after printing finishes about one pattern, printing cannot do it. That is, the above-mentioned PS plate and a change are not about the situation from which the version used at once serves as a disposal. That is, the cost concerning the suitable part printing was to go up. Moreover, it cannot be called desirable situation to make into a disposal the version used at once also from the position of the earth environment protection which came to be advocated suddenly in recent years.
[0007] this invention was made in view of the above-mentioned situation, and the place made into the purpose is to offer the printing machine using the plate for printing and it which can be reused corresponding to digitization of presswork.
[0008]
[Means for Solving the Problem] this invention took the following means, in order to solve the above-mentioned technical problem. That is, the plate for printing according to claim 1 is characterized by having the application layer which consists of a compound which can be disassembled by irradiating the light of the wavelength which has energy higher than the bandgap energy of the aforementioned titanium oxide photocatalyst on the coat layer containing the titanium oxide photocatalyst formed through direct or an interlayer on the surface of a base material, and this coat layer.
[0009] the thing with the portion which indicates a hydrophilic property to be the portion which shows a hydrophobic property by operation of a compound and a titanium oxide photocatalyst for which it is alike, respectively and a field is divided is possible for the front face of this plate for printing In addition, a hydrophilic portion is appeared by irradiating light (generally ultraviolet rays) on a coat layer front face. And it becomes possible to demonstrate the function as a plate for printing by using the non-streak section to which ink does not adhere the portion changed into the hydrophilic property concerned, and the hydrophobic portion which remains as the streak section to which ink adheres. Moreover, when an interlayer is minded between a base material and the aforementioned coat layer, it becomes possible to fully maintain the bond strength of the coat layer concerned.

[0010] Moreover, as for the plate for printing according to claim 2, the aforementioned application layer front face is characterized by showing hydrophobic property at least 50 degrees or more by the contact angle of water in the initial state at the time of version production.
[0011] According to this, in the initial state at the time of version production, it can be said that it is in the state where the whole version surface may serve as the streak section.
[0012] Moreover, by irradiating the aforementioned light on the aforementioned application layer front face, the plate for printing according to claim 3 is characterized by changing this coat layer front face into the hydrophilic front face on which the contact angle of water becomes 10 degrees or less while it makes the aforementioned coat layer front face appear.
[0013] According to this, since the coat layer front face which irradiated the light of wavelength with energy higher than the bandgap energy of a titanium oxide photocatalyst is changed into a hydrophilic front face, it becomes possible [using the portion as the non-streak section]. By the way, in this hydrophilicity-ized processing, it has suggested that an operation as shown below is obtained. That is, operation that disassembly of the aforementioned compound is promoted by the original "catalyst" operation by the aforementioned titanium oxide photocatalyst, and the titanium oxide photocatalyst front face itself are the operations from which it becomes the hydrophilic front face where the contact angle of water becomes 10 degrees or less. Therefore, it will be guessed that the aforementioned hydrophilicity-ized processing can be promptly completed in this case. Moreover, this UV irradiation can be made to be carried out based on the digital data based on the picture which it is going to print, for example, and it can say that it is a thing corresponding to digitization of presswork for the plate for printing by this invention in this case.
[0014] Moreover, the plate for printing according to claim 4 is set to the initial state at the time of version production. When the contact angle of water irradiates the aforementioned light on the aforementioned application layer front face which shows hydrophobic property at least 50 degrees or more While making the aforementioned coat layer front face appear in the field to which the light concerned was irradiated, the contact angle of water changes this coat layer front face into a hydrophilic front face 10 degrees or less, and it is characterized by using the non-streak section and the hydrophobic front face which remains for the front face concerned which becomes hydrophilic as the streak section.
[0015] It can say that this is a plate for printing which has the same operation as invention indicated to the claim 2 and claim 3 which were mentioned above. Therefore, this plate for printing can be called what can respond also to digitization of presswork while it can employ an original operation of titanium oxide light "a catalyst" efficiently in hydrophilicity-ized processing.
[0016] Moreover, the reproduction method of the plate for printing according to claim 5 The coat layer containing the titanium oxide photocatalyst formed through direct or an interlayer on the surface of a base material, It is in the plate for printing equipped with the application layer which consists of a compound which can be disassembled by irradiating the light of the wavelength which has energy higher than the bandgap energy of the aforementioned titanium oxide photocatalyst on this coat layer. The process which cleans the outermost front face including the aforementioned coat layer front face where at least a part shows a hydrophilic property after a printing end and in the field, It is characterized by including at least the process which makes the hydrophobic front face where the reconstitution of the account application layer of back to front is carried out, and the contact angle of water becomes 50 degrees or more appear, and the process which irradiates the aforementioned light on the application layer front face concerned after that further.
[0017] According to this, since a coat layer front face will be changed hydrophobic by applying a compound, the thing as what was indicated to the claim 3 with this same plate for printing, i.e., the plate for printing, can consider that it would be in the initial state at this time. Moreover, this is got blocked and it means that reuse of the plate for printing is possible. Furthermore, since it says that the conversion work to the above-mentioned fact, i.e., a hydrophobic property, is substantially based only on the application work of a compound, it can be said that the work concerned can be completed promptly.
[0018] Moreover, the reproduction method of the plate for printing according to claim 6 is characterized by performing the reproduction method of the plate for printing according to claim 5 on a printing machine.
[0019] It becomes possible to do continuous printing work, without according to this, inserting discontinuation of the printing work considered to follow generally at the time of the work concerning conversion to the aforementioned hydrophobic property, in case it actually prints.
[0020]
[Embodiments of the Invention] Below, the gestalt of operation of this invention is explained with reference to drawing. Drawing 1 shows the cross section also showing the front face of the plate for printing concerning this operation gestalt. In drawing 1 , the base material 1 consists of aluminum. In addition, although it can be called very general gestalt to use aluminum as a plate for printing, this invention is not limited to this.
[0021] The interlayer 2 is formed on the base-material 1 front face. As an interlayer 2, silicon system compounds, such as a silica (SiO2), silicone resin, and silicone rubber, are used as the quality of the material, for example. Among those, especially as silicone resin, silicone alkyd, silicone urethane, silicone epoxy, a silicone acrylic, silicone polyester, etc. are used. It is formed in order that this interlayer 2 may make adhesion with the aforementioned base material 1 and the coat layer 3 mentioned later become a positive thing, and in order to secure adhesion. That is, the bond strength of a result, a base material 1, and the coat layer 3 is to be secured by sticking the coat layer 3 and an interlayer 2 for a base material 1 and an interlayer 2 certainly again, respectively.
[0022] On the interlayer 2, the coat layer 3 containing a titanium oxide photocatalyst is formed. In this coat layer 3 front face, it is possible to make the portion which shows a hydrophobic property to the initial state at the time of version production, and shows a hydrophilic property by irradiating ultraviolet rays appear. This property depends on the property with which the

aforementioned titanium oxide photocatalyst is equipped. In addition, suppose about this that it explains in detail later.
[0023] In order to improve the transfer characteristic of the aforementioned property, i.e., a hydrophobic shell hydrophilic property, in this coat layer 3, it is good for it as what added the matter as shown below for the purpose of raising the intensity of the coat layer 3 concerned, and adhesion with a base material 1. The metallic oxide or metal hydroxide which serves as this matter from silica system compounds, such as a silica, a silica sol, an organosilane, and silicon resin, and a zirconium, aluminum, etc., and also a fluorine system resin can be mentioned. In addition, if the strong oxidizing power of a titanium oxide photocatalyst is taken into consideration, an inorganic compound can call composition of the coat layer 3 a desirable thing from a viewpoint of preventing degradation of the coat layer 3.
[0024] Moreover, although there are the anatase type and rutile type with which the crystal structures differ, respectively as the titanium oxide photocatalyst itself and both can use in this operation gestalt, generally the anatase type with a high photocatalyst operation is more desirable. Moreover, in order to raise the resolution of the picture written in a printing plate and to enable highly minute printing, and in order for forming the coat layer 3 used as thin thickness to also make it possible to store in a visual field, as for the particle size of a titanium oxide photocatalyst, it is desirable that it is 0.1 micrometers or less.
[0025] In addition, if it is marketed and usable things are concretely enumerated in this operation gestalt as a titanium oxide photocatalyst to be used Ishihara Sangyo ST- 01, ST-21, workpiece ST-K01 of those, ST-K03, moisture powder type STS-01, STS-02, and STS-21 -- moreover LACTI-01 [Sakai Chemical Industry 25 / SSP-/, SSP-20, SSP-M, CSB, CSB-M, and paint type], TAYCA 100 [ÂTM-], ATM-600, and ST-157 grade can be mentioned. However, even if there is this invention in addition to these titanium oxide photocatalysts, of course, it can apply.
[0026] Moreover, as for the thickness of the coat layer 3, it is desirable that it is within the limits of 0.01-10 micrometers. Because, it is because it becomes difficult to fully employ said property efficiently if thickness is too small, and it will become easy to carry out the cracking crack of the coat layer 3 if thickness is too large, and it becomes the factor of a ****-proof fall. In addition, since this cracking crack is notably observed when thickness exceeds 50 micrometers, though it eases the aforementioned range, it needs to recognize the 50 micrometers concerned as the upper limit. Moreover, it can be said that a general gestalt serves as about 2-3-micrometer thickness in practice.
[0027] Furthermore, what is necessary is to choose suitably the sol applying method, the organic titanate method, a vacuum deposition, etc., and just to form them as the formation method of this coat layer 3. As long as it adopts at this time, for example, the applying method, in the application liquid used for it, you may add a solvent, a cross linking agent, a surfactant, etc. other than various kinds of aforementioned matter which raises the intensity of a titanium oxide photocatalyst and the aforementioned coat layer 3, and adhesion with a base material 1. Moreover, it is more more desirable to act latter one, although an ordinary temperature dryness type or a stoving type is sufficient as application liquid. It is because the direction which raised the intensity of the coat layer 3 by heating becomes advantageous to raising the ****-proof of a version.
[0028] On the coat layer 3, the application layer 4 which consists of a compound which can be disassembled by irradiating the light of wavelength with energy higher than the bandgap energy of a titanium oxide photocatalyst is formed. As shown in drawing 1 , as for this application layer 4 front face, the contact angle of water shows hydrophobic property at least 50 degrees or more. Incidentally, if it is made for a contact angle to become 80 degrees or more, it can be said that it is in a more desirable state. In this state, since it has become difficulty, i.e., the state where the so-called water repellence is very high, that water adheres to application layer 4 front face so that guessing also from drawing 1 may be possible, if it says conversely, it can be said that the state with easy the ink for printing adhering on application layer 4 front face is appearing.
[0029] Below, the operation and effect about the plate for printing used as the above-mentioned composition are explained. First, in the initial state at the time of plate production for printing, the coat layer 3 aforementioned front face is adjusted, as are shown in drawing 1 , and the contact angle of water shows hydrophobic property at least 50 degrees or more. Carrying out "the initial state at the time of version production" here and "adjusting so that a hydrophobic property may be shown" specifically points out the following **** situations. First, it is carried out by forming the application layer 4 which becomes carrying out "adjusting so that a hydrophobic property may be shown" from the compound which can be disassembled into coat layer 3 front face by UV irradiation, and drying it. In addition, what is necessary is just to adopt suitably methods, such as spray coating, blade coating, deep coating, and roll coating, as this application. Moreover, dryness may be ordinary temperature or a method by any of heating. And the time of coat layer 3 front face becoming hydrophobic by these "adjustment" is pointed out, and it is the thing which is "an initial state at the time of version production" and which carries out a purport convention.
[0030] having the operation which gives a hydrophobic property to the aforementioned front face as the above-mentioned compound -- of course -- it -- UV irradiation -- "-- easy -- " -- that by which oxidative degradation is carried out is desirable. Specifically A ** trimethyl methoxy silane, a trimethyl ethoxy silane, Dimethyl diethoxysilane, methyl trimetoxysilane, a tetramethoxy silane, Methyl triethoxysilane, a tetrapod ethoxy silane, methyl dimethoxysilane, ARUKOKI xylan ** trimethylchlorosilanes, such as octadecyltrimethoxysilane and octadecyl triethoxysilane, A dimethyldichlorosilane, a methyltrichlorosilane, methyl dichlorosilane, Chlorosilicane ** vinyl trichlorosilanes, such as a dimethyl chlorosilicane, Vinyltriethoxysilane, gamma-chloropropyltrimetoxysilane, gamma-chloropropyl methyl dichlorosilane, gamma-chloropropyl methyl dimethoxysilane, Lacan coupling-agent ** hexamethyldisilazanes, such as gamma-chloropropyl methyldiethoxysilane and gamma-aminopropyl triethoxysilane, An N and N'-screw (trimethylsilyl) urea, N-trimethylsilyl acetamide, Phloroalkyl silane ** dimethyl hydrogen polysiloxanes, such as silazane ** perphloro alkyl trimethoxysilane, such as dimethyl trimethyl silylamine and diethyl trimethyl silylamine The silicone oil ** lauric acid of a type, a myristic acid, Fatty acids, such as a PAL thymine acid, stearin acid, and oleic acid, etc. are mentioned. However, this invention cannot be overemphasized by that it is not what is

restricted only to these compounds. Furthermore, even if it dilutes and uses these compounds with a solvent if needed. it is easy to be natural [compounds].

[0031] In addition, as long as it more generally says "the initial state at the time of version production" as used in the field of above, you may regard it as the time of the start in actual presswork. That is, about a certain given arbitrary pictures. the data which digitized it are already prepared and it can be regarded as what points out the state when imprinting this on a plate. However, the stage where this digitization data is prepared may be, after performing hydrophilicity-ized processing about coat layer 3 front face mentioned later, and what was described now should not be understood strictly. That is, when defining "the initial state at the time of version production" as "the time of an actual presswork start" as mentioned above, it shall be interpreted in a wide sense.

[0032] Next, UV irradiation as shown in drawing 2 is carried out to application layer 4 front face which will be in the above-mentioned state. Based on the digital data about said picture, this UV irradiation is performed so that it may correspond to the data. In addition, ultraviolet rays here are the light of wavelength with energy higher than the bandgap energy of a titanium oxide photocatalyst. More specifically, they are the ultraviolet rays containing light with a wavelength of 400nm or less.

[0033] By this UV irradiation, as similarly shown in drawing 2 , while the coat layer 3 front face appears by the aforementioned compound which constitutes the application layer 4 being disassembled, as the front face concerned shows a hydrophilic property. it is changed. This is based on an operation of a titanium oxide photocatalyst. In addition, since it goes on by the original operation as a titanium oxide light "a catalyst", disassembly of a compound will be completed very promptly. As for the field where the ultraviolet rays in coat layer 3 front face were irradiated by these things, the contact angle of water will be in a state 10 degrees or less. This state serves as a relation exactly contrary to the state on the front face of hydrophobic in the previous application layer 4. That is, although most water will spread on coat layer 3 front face in the shape of a film, the ink for printing becomes impossible [adhering to this front face].

[0034] Incidentally, the titanium oxide photocatalyst is said in general as follows about the hydrophilicity-ized mechanism by UV irradiation. When a titanium oxide photocatalyst becomes un-hydrophilic, as shown in the drawing 3 left. oxygen is in the state where the bridge was carried out, in the front face. For this reason, a moisture child will not adhere to a front face and will demonstrate a result hydrophobic property. On the other hand, if ultraviolet rays are irradiated at this, the bridge state of previous oxygen will be dispelled, and as shown in the method of the drawing 3 right, a hydroxyl group will appear on a front face. And this hydroxyl group will adsorb the water which exists on a front face, and a hydrophilic property will be demonstrated. In addition, the gestalt which this hydroxyl group exposed on the front face tends to shift to nature to the original hydrophobic front face, if it is left. That is, the state where the bridge of the oxygen was carried out can say chemically that it is stable.

[0035] If processing to the above is completed, the ink for printing will be applied to the application layer 4 or coat layer 3 hydrophilicity--ization-processed front face. Then, the plate for printing as shown, for example in drawing 4 will be produced. In this drawing, the portion by which hatching was carried out is a portion into which the portion in which the above-mentioned hydrophilicity-ized processing was not made, i.e., a hydrophobic portion, and the application layer 4 remain, therefore the streak section to which the ink for printing adhered is shown, the ink for printing is crawled and the portion of one ground. i.e., a hydrophilic portion, and the coat layer 3 surface portion show the non-streak section by which the adhesion was not made. Thus, when a pattern emerges, this plate for printing will have the operation as a parent version.

[0036] Then, the usual presswork is performed and this is terminated. And to the plate for printing which finished this printing. the application layer 4 which consists of a compound which was again mentioned above is formed. Therefore, the plate for printing will have returned to "the initial state at the time of version production" again in the stage which finished this application That is, on coat layer 3 front face, the application layer 4 in which adhesion of the ink for printing can adhere to the whole surface will be formed at this time, and the hydrophobic property will be shown, and if UV irradiation is again performed on this front face, it will become possible to produce the new parent version for printing. Speaking directly, the plate for printing in this operation form being what can be used repeatedly, if the reuse puts in another way.

[0037] The graph shown in drawing 5 shows collectively what was explained above. It is the graph with which this took time along the horizontal axis and took the contact angle of water along the vertical axis, and it is shown about the plate for printing in this operation form how the contact angle (namely, a canal, a hydrophilic state) of the water of the front face changes with time. in addition, this drawing -- a titanium oxide photocatalyst -- the performance applied hydrophobic if independent -- not being enough (the contact angle of the water before UV irradiation not becoming 50 degrees or more) -- since hydrophobic, it is what showed the case where the titanium oxide photocatalyst equipped with the capacity which the conversion to a hydrophilic property completes promptly was used

[0038] According to this, as the coat layer 3 original front face was described above first, the contact angle of water is 20-30 degrees, and hydrophobic ability is not enough. Therefore, it is inadequate for using as the streak section with this. and this cannot be used as a plate for printing. However, this titanium oxide photocatalyst is equipped with the capacity promptly changed into a hydrophilic front face if ultraviolet rays are irradiated as shown in drawing. If it is in usual, although it is common that about 10 mins start as for this conversion, it turns out that it is completed by 1-2min in this example.

[0039] Next, the hydrophobic property of a plate will be in sufficient state as | show / in the curve A in drawing 5 | by applying a compound to coat layer 3 front face, namely, forming the application layer 4 in it. Namely, it will be in the state which adhesion of ink is attained and can present use of printing. Moreover, this is got blocked and it is "an initial state at the time of version production" (drawing 5 middle point B). In addition, since it is good only by applying a compound substantially as described above in order to appear this "initial state at the time of version production", it is clear that this can be extremely completed to the

inside of a short time.
[0040] Then, while performing UV irradiation and disassembling the aforementioned compound, a part of coat layer 3 front face at least] is changed as a hydrophilic portion. In addition, since hydrophobic, as shown in the curve C in drawing 5 , the thing [in / this titanium oxide photocatalyst / by both operations of that the conversion rate to a hydrophilic property uses the above large titanium oxide photocatalysts in this case since hydrophobic, and completing / as disassembly of a compound stated previously / promptly /-by original operation of titanium oxide light "catalyst" **] to complete by 1-2min is possible for the conversion to a hydrophilic property.
[0041] The plate for printing to which the above-mentioned processing was performed will adhere to the ink for printing, and actual printing will be performed as shown in the straight line D in drawing 5 . Hereafter, after printing is completed, to the plate for printing, processing of the application of a compound, UV irradiation, etc. will be performed like the above, and reuse will be presented with it.
[0042] As stated now, the plate for printing in this operation gestalt is equipped also with the advantage which can quicken the cycle with last thing also for the advantage of being reusable. That is, according to the above, the work for realizing them is not to take time anyway also by giving a hydrophilic property also giving a hydrophobic property. Therefore, it is what has possible completing the whole presswork very promptly.
[0043] Below, the invention-in-this-application persons concerning production and printing of the plate for printing check and depend, and explain a concrete example. first, the base material made from aluminum whose thickness the area is postcard size and is 0.3mm -- preparing -- this -- the Sakai Chemical Industry make -- primer LAC PR-01 were applied and dried The thickness of the primer after dryness was 1.4 micrometers. In addition, with this primer layer, it will correspond to the interlayer 2 in drawing 1 . Then, applied titanium oxide photocatalyst coating agent ST-K03 of the Ishihara Sangyo nature, it was made to dry at 150 degrees C, and the coat layer 3 with a thickness of 0.8 micrometers was formed. Furthermore, what diluted Toshiba Silicone octadecyltrimethoxysilane (tradename TSL 8185) with ethanol to 3wt% concentration to this coat layer 3 front face. agitated slowly for 5 minutes, added [as opposed to / this solution / further] 2000 ppm of acetic acids. agitated slowly for 5 minutes again, and was used as hydrophobing processing liquid was applied by roll coating. And this was dried at 120 degrees C and the "initial state at the time of version production" explained several times by the above was made to appear.
[0044] About the plate which applied the above-mentioned hydrophobing processing liquid (namely, octadecyltrimethoxysilane) It masks mostly in paper with the black square on the front face of a plate whose one side is 2cm about a center section. Immediately after carrying out irradiation of the ultraviolet rays of illuminance 40 mW/cm2 "for 2 minutes", when the contact angle of water was measured using the CA-W type contact angle meter made from consonance surface chemistry about the UV irradiation portion into the portion which is not masked, the contact angle became "0-2 degrees", and showed hydrophilic property sufficient as the non-streak section.
[0045] This plate was attached in the SAN OFF-SET 220E DX type card printing machine made from SAN PRINTING MACHINRS, and it printed by 2500 print speeds/o'clock on eye best paper using the Toyo Ink ink HYECOO B red M/ and the Mitsubishi Heavy Industries dampening water RISOFERO 1% solution. Consequently, one side which ink does not adhere to the printing plate of the portion which irradiated ultraviolet rays, but is equivalent to the masked plate portion has printed on space the red picture of the square which is 2cm.
[0046] moreover, this -- then, what applied hydrophobing processing liquid by the same method, was made to dry this, carried out circular black masking whose diameter is 2cm to having mentioned above in the plate surface center section further to the above-mentioned plate for printing which ended printing, and irradiated the ultraviolet rays of illuminance 40 mW/cm2 for 2 minutes was made as an experiment It becomes the processing carried out in case reuse of this, i.e., the plate for printing, is aimed at. The diameter equivalent to the plate portion masked also in actual printing also by this while the contact angle of the water in a UV irradiation portion became 0-2 degrees and hydrophilic property sufficient as the non-streak section was shown was able to print on space the circular red picture which is 2cm.
[0047] Next, where a version is attached in a card printing machine, after wiping off the ink and dampening water which adhered on the printing plate and applying the aforementioned hydrophobing processing liquid by roll coating, it was made to dry by 120-degree C hot blast, and hydrophobing of the plate front face was carried out. Mostly, it masked in paper with the black equilateral triangle of this version that carried out hydrophobing processing whose one side is 2cm about a center section, and the ultraviolet rays of illuminance 40 mW/cm2 were irradiated for 10 minutes at the portion which is not masked. When printed the same with having mentioned this plate above, the red picture of the equilateral triangle whose one side which ink does not adhere to the printing plate of the portion which irradiated ultraviolet rays, but is equivalent to the masked plate portion is 2cm has printed on space.
[0048] In addition, the above-mentioned printing was performed using the printing machine 10 as shown in drawing 6 . That is, this printing machine 10 is what equipped the circumference with coating equipment 12, the Blanc drum 13, version cleaning equipment 14, write-in equipment 15, the inking roller 16, and the dryer 17 focusing on the version drum 11. The plate for printing is twisted around the version drum 11, and is installed.
[0049] In this printing machine 10, the actual process which presents reuse with the version which ended printing as described above is performed as follows. First, version cleaning equipment 14 is made into the state where it touched to the version drum 11, and the ink and dampening water which adhered on the outermost front face of a plate, i.e., a printing plate, are wiped off. Then, version cleaning equipment 14 is made to secede from the version drum 11, and coating equipment 12 is made into the state where the version drum 11 was touched. The aforementioned hydrophobing processing liquid is applied on the plate by this.

Then, coating equipment 12 is made to secede from the version drum 11, a dryer 17 is worked, and hydrophobing processing liquid is dried. Next, based on the digital data of the picture prepared beforehand, a picture is written in the plate front face by which hydrophobing was carried out by the ultraviolet rays which write-in equipment 15 emits. If the above process is completed, the inking roller 16 and the Blanc drum 13 will be made into the state of touching to the version drum 11. And continuous printing is performed by flowing in the direction of the arrow shown in drawing 6 so that paper 18 may touch the Blanc drum 13.

[0050] As explained above, the plate for printing in this operation gestalt can enable the reuse the property which a titanium oxide photocatalyst has, i.e., by using the conversion property to a hydrophilic property, since hydrophobic, and can decrease remarkably the amount of the plate discarded after use. Therefore, the cost in connection with the part and a plate can be reduced sharply. Moreover, since the picture writing from the digital data concerning a picture to a plate can be directly carried out by light (ultraviolet rays), digitization correspondence of presswork has accomplished it and it can plan large time shortening for the suitability, and cost reduction.

[0051] Moreover, as the top also described, the application layer 4 which consists of a compound will be formed, and, in the case of this operation gestalt which aims at reuse for the plate for printing, speeding up of the whole presswork can be attained. The fact which disassembly of the compound concerned is promoted by original operation of titanium oxide light "a catalyst", and completes promptly contributes to this greatly. Furthermore, since hydrophobic, if the conversion rate to a hydrophilic property uses a large titanium oxide photocatalyst primarily, it will contribute to still much more speeding up greatly.

[0052] Furthermore, since it is possible for the processing which aims at reuse of the plate for printing to perform this on a printing machine, speeding up of printing work is realizable. In addition, in the above-mentioned example, since the picture writing to the 4th page of an application layer was also performed on the printing machine, quicker work can be done.

[0053] In addition, in this operation gestalt, although an interlayer 2 is formed between a base material 1 and the coat layer 3, this invention is not limited to this. That is, an interlayer 2 does not necessarily need to prepare. In addition, it can say in this way because the main essence of this invention will be spoiled so that clearly from the upper explanation, though an interlayer 2 is not formed.

[0054]

[Effect of the Invention] As explained above, the plate for printing according to claim 1 can perform conversion to a hydrophobic shell hydrophilic property in the front face by irradiating the light of wavelength with energy higher than the bandgap energy of a titanium oxide photocatalyst by forming an application layer on the coat layer which contains a titanium oxide photocatalyst on the surface of a base material, and this coat layer. Therefore, it becomes possible by using the streak section and a hydrophilic portion for a hydrophobic portion as the non-streak section to demonstrate the function as a plate for printing. In addition, both bond strength can be made enough by preparing an interlayer between a base material and a coat layer at this time. Moreover, the aforementioned compound is matter to which oxidative degradation advances comparatively easily by irradiation of the aforementioned light while being a compound which fitted the aforementioned coat layer as what gives a hydrophobic property. Therefore, the conversion on the above-mentioned hydrophilic front face from a hydrophobic front face can be completed promptly.

[0055] Moreover, it can be said that the plate for printing according to claim 2 is in the state where the whole version surface may serve as the streak section, in the initial state concerned since the contact angle of water shows | the aforementioned application layer front face | hydrophobic property at least 50 degrees or more in the initial state at the time of version production. Conversely, if UV irradiation which will be imitated in a picture to this application layer front face if it says is performed, it becomes possible to make the picture concerned emerge and this can be used as a parent version.

[0056] Moreover, the plate for printing according to claim 3 becomes possible | using the portion as the non-streak section | by irradiating the aforementioned light on the aforementioned application layer front face. In addition, the aforementioned application layer will be promptly decomposed in response to an original "catalyst" operation of a titanium oxide photocatalyst at the time of this hydrophilicity-ized processing at this time. Therefore, according to this invention, it can be said that it is what can attain speeding up of the production process of the plate for printing, as a result speeding up of presswork. Moreover, it is possible for irradiation of the aforementioned light to be made to be performed based on the digital data based on the picture which is going to carry out the object for printing. Therefore, it can say that the plate for printing by this invention corresponds to digitization of presswork, and, so, large shortening of printing time and cost reduction can be planned.

[0057] Moreover, it can be said that the plate for printing according to claim 4 has a combination-operation of invention indicated to the claim 2 and claim 3 which were mentioned above. Therefore, this plate for printing is what has possible | it is possible to employ an original operation of titanium oxide light "a catalyst" efficiently in hydrophilicity-ized processing, and | while being able to attain speeding up of work corresponding to digitization of presswork, and can plan large shortening and the large cost reduction of printing time like the above.

[0058] Moreover, since the reproduction method of the plate for printing according to claim 5 changes the front face concerned into the aforementioned coat layer front face on which at least a part shows a hydrophilic property in the field hydrophobic by applying a compound, it becomes the thing which can reuse the plate for printing. Therefore, it is not necessary to consider as a disposal with a printing end, and the suitable part cost reduction can be planned like the conventional plate for printing. Moreover, since it says that the conversion work to the above-mentioned fact, i.e., a hydrophobic property, is substantially based only on the application work of a compound, the work concerned can be made to complete promptly.

[0059] Moreover, since the reproduction method of the plate for printing according to claim 6 does the work concerning conversion to the aforementioned hydrophobic property on a printing machine, it does not sandwich discontinuation of the

printing work considered to follow generally at the time of the work. Therefore, continuous printing work can be done and speeding up of printing work can be attained. In addition, in this invention, it cannot be overemphasized that the merit concerning reuse of a version is also simultaneously enjoyable.

[Translation done.]

* NOTICES *

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TECHNICAL FIELD

[The technical field to which invention belongs] this invention relates to the plate for printing, and its reproduction method.

[Translation done.]

* NOTICES *

PRIOR ART

[Description of the Prior Art] Digitization of presswork is advancing as general printing technology these days. This is the attempt which is going to produce a version by digital-data-izing and using this data as it is by minding the image data read with the scanner etc. for a personal computer etc. While being able to attain laborsaving of printing work by this, it also becomes possible to perform high definition printing.

[0003] By the way, generally the so-called PS plate is conventionally known as a plate used for printing. This makes anodic oxidation aluminum the non-streak section of a hydrophilic property, and has the hydrophobic streak section which was made to harden a photopolymer and was formed on the front face. Printing is performed when the ink adhering to the streak section of the above-mentioned hydrophobic property transfers on space. But this PS plate cannot respond to the above-mentioned presswork digitization.

[0004] On the other hand, corresponding to digitization of presswork besides the above-mentioned PS plate, the method of making production of a version easy is also proposed. For example, by writing in laser absorption layers, such as carbon black, on a PET film, and writing in a streak in what applied the silicon resin layer on it further by the laser beam, a laser absorption layer is made to generate heat and the method of burning a silicon resin layer off with the heat, and producing a version is learned. Moreover, how to burn off like the above the hydrophilic layer which applied the laser absorption layer of lipophilic property on the aluminum version, and was further applied on it by the laser beam, and use as a version etc. is learned.

[Translation done.]

* NOTICES *

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, there were the following problems in the above-mentioned conventional technology. First, in the above-mentioned PS plate, since much time and cost were needed for the production, in printing of a small number of number of copies, it had become the factor of a printing cost rise. Moreover, when printing of one pattern finished and the next printing was performed, the exchange work of a version was needed and the version currently used by old had become a disposal. Furthermore, the PS plate cannot respond to digitization of presswork. as mentioned above. That is, in the PS plate, it was impossible to have realized presswork digitization for being unable to produce a version directly from digital data, but realizing laborsaving and highly minute printing.

[0006] Moreover, although it is possible surely to produce the direct version from digital data, if the thing using the thing or the aluminum version using production of the version corresponding to the above-mentioned digitization, i.e., a PET film, is not exchanged for a new version after printing finishes about one pattern, printing cannot do it. That is, the above-mentioned PS plate and a change are not about the situation from which the version used at once serves as a disposal. That is, the cost concerning the suitable part printing was to go up. Moreover, it cannot be called desirable situation to make into a disposal the version used at once also from the position of the earth environment protection which came to be advocated suddenly in recent years.

[0007] this invention was made in view of the above-mentioned situation, and the place made into the purpose is to offer the printing machine using the plate for printing and it which can be reused corresponding to digitization of presswork.

[Translation done.]

* NOTICES *

MEANS

[Means for Solving the Problem] this invention took the following means, in order to solve the above-mentioned technical problem. That is, the plate for printing according to claim 1 is characterized by having the application layer which consists of a compound which can be disassembled by irradiating the light of the wavelength which has energy higher than the bandgap energy of the aforementioned titanium oxide photocatalyst on the coat layer containing the titanium oxide photocatalyst formed through direct or an interlayer on the surface of a base material, and this coat layer.
[0009] the thing with the portion which indicates a hydrophilic property to be the portion which shows a hydrophobic property by operation of a compound and a titanium oxide photocatalyst for which it is alike, respectively and a field is divided is possible for the front face of this plate for printing In addition, a hydrophilic portion is appeared by irradiating light (generally ultraviolet rays) on a coat layer front face. And it becomes possible to demonstrate the function as a plate for printing by using the non-streak section to which ink does not adhere the portion changed into the hydrophilic property concerned, and the hydrophobic portion which remains as the streak section to which ink adheres. Moreover, when an interlayer is minded between a base material and the aforementioned coat layer, it becomes possible to fully maintain the bond strength of the coat layer concerned.
[0010] Moreover, as for the plate for printing according to claim 2, the aforementioned application layer front face is characterized by showing hydrophobic property at least 50 degrees or more by the contact angle of water in the initial state at the time of version production.
[0011] According to this, in the initial state at the time of version production, it can be said that it is in the state where the whole version surface may serve as the streak section.
[0012] Moreover, by irradiating the aforementioned light on the aforementioned application layer front face, the plate for printing according to claim 3 is characterized by changing this coat layer front face into the hydrophilic front face on which the contact angle of water becomes 10 degrees or less while it makes the aforementioned coat layer front face appear.
[0013] According to this, since the coat layer front face which irradiated the light of wavelength with energy higher than the bandgap energy of a titanium oxide photocatalyst is changed into a hydrophilic front face, it becomes possible [using the portion as the non-streak section]. By the way, in this hydrophilicity-ized processing, it has suggested that an operation as shown below is obtained. That is, operation that disassembly of the aforementioned compound is promoted by the original "catalyst" operation by the aforementioned titanium oxide photocatalyst, and the titanium oxide photocatalyst front face itself are the operations from which it becomes the hydrophilic front face where the contact angle of water becomes 10 degrees or less. Therefore, it will be guessed that the aforementioned hydrophilicity-ized processing can be promptly completed in this case. Moreover, this UV irradiation can be made to be carried out based on the digital data based on the picture which it is going to print, for example, and it can say that it is a thing corresponding to digitization of presswork for the plate for printing by this invention in this case.
[0014] Moreover, the plate for printing according to claim 4 is set to the initial state at the time of version production. When the contact angle of water irradiates the aforementioned light on the aforementioned application layer front face which shows hydrophobic property at least 50 degrees or more While making the aforementioned coat layer front face appear in the field to which the light concerned was irradiated, the contact angle of water changes this coat layer front face into a hydrophilic front face 10 degrees or less, and it is characterized by using the non-streak section and the hydrophobic front face which remains for the front face concerned which becomes hydrophilic as the streak section.
[0015] It can say that this is a plate for printing which has the same operation as invention indicated to the claim 2 and claim 3 which were mentioned above. Therefore, this plate for printing can be called what can respond also to digitization of presswork while it can employ an original operation of titanium oxide light "a catalyst" efficiently in hydrophilicity-ized processing.
[0016] Moreover, the reproduction method of the plate for printing according to claim 5 The coat layer containing the titanium oxide photocatalyst formed through direct or an interlayer on the surface of a base material, It is in the plate for printing equipped with the application layer which consists of a compound which can be disassembled by irradiating the light of the wavelength which has energy higher than the bandgap energy of the aforementioned titanium oxide photocatalyst on this coat layer. The process which cleans the outermost front face including the aforementioned coat layer front face where at least a part shows a hydrophilic property after a printing end and in the field, It is characterized by including at least the process which makes the hydrophobic front face where the reconstitution of the account application layer of back to front is carried out, and the contact angle of water becomes 50 degrees or more appear, and the process which irradiates the aforementioned light on the application layer front face concerned after that further.
[0017] According to this, since a coat layer front face will be changed hydrophobic by applying a compound, the thing as what

was indicated to the claim 3 with this same plate for printing, i.e., the plate for printing, can consider that it would be in the initial state at this time. Moreover, this is got blocked and it means that reuse of the plate for printing is possible. Furthermore, since it says that the conversion work to the above-mentioned fact, i.e., a hydrophobic property, is substantially based only on the application work of a compound, it can be said that the work concerned can be completed promptly.

[0018] Moreover, the reproduction method of the plate for printing according to claim 6 is characterized by performing the reproduction method of the plate for printing according to claim 5 on a printing machine.

[0019] It becomes possible to do continuous printing work, without according to this, inserting discontinuation of the printing work considered to follow generally at the time of the work concerning conversion to the aforementioned hydrophobic property, in case it actually prints.

[0020]

[Embodiments of the Invention] Below, the gestalt of operation of this invention is explained with reference to drawing. Drawing 1 shows the cross section also showing the front face of the plate for printing concerning this operation gestalt. In drawing 1 , the base material 1 consists of aluminum. In addition, although it can be called very general gestalt to use aluminum as a plate for printing, this invention is not limited to this.

[0021] The interlayer 2 is formed on the base-material 1 front face. As an interlayer 2, silicon system compounds, such as a silica (SiO2), silicone resin, and silicone rubber, are used as the quality of the material, for example. Among those, especially as silicone resin, silicone alkyd, silicone urethane, silicone epoxy, a silicone acrylic, silicone polyester, etc. are used. It is formed in order that this interlayer 2 may make adhesion with the aforementioned base material 1 and the coat layer 3 mentioned later become a positive thing, and in order to secure adhesion. That is, the bond strength of a result, a base material 1, and the coat layer 3 is to be secured by sticking the coat layer 3 and an interlayer 2 for a base material 1 and an interlayer 2 certainly again, respectively.

[0022] On the interlayer 2, the coat layer 3 containing a titanium oxide photocatalyst is formed. In this coat layer 3 front face, it is possible to make the portion which shows a hydrophobic property to the initial state at the time of version production, and shows a hydrophilic property by irradiating ultraviolet rays appear. This property depends on the property with which the aforementioned titanium oxide photocatalyst is equipped. In addition, suppose about this that it explains in detail later.

[0023] In order to improve the transfer characteristic of the aforementioned property, i.e., a hydrophobic shell hydrophilic property, in this coat layer 3, it is good for it as what added the matter as shown below for the purpose of raising the intensity of the coat layer 3 concerned, and adhesion with a base material 1. The metallic oxide or metal hydroxide which serves as this matter from silica system compounds, such as a silica, a silica sol, an organosilane, and silicon resin, and a zirconium, aluminum, etc., and also a fluorine system resin can be mentioned. In addition, if the strong oxidizing power of a titanium oxide photocatalyst is taken into consideration, an inorganic compound can call composition of the coat layer 3 a desirable thing from a viewpoint of preventing degradation of the coat layer 3.

[0024] Moreover, although there are the anatase type and rutile type with which the crystal structures differ, respectively as the titanium oxide photocatalyst itself and both can use in this operation gestalt, generally the anatase type with a high photocatalyst operation is more desirable. Moreover, in order to raise the resolution of the picture written in a printing plate and to enable highly minute printing, and in order for forming the coat layer 3 used as thin thickness to also make it possible to store in a visual field, as for the particle size of a titanium oxide photocatalyst, it is desirable that it is 0.1 micrometers or less.

[0025] In addition, if it is marketed and usable things are concretely enumerated in this operation gestalt as a titanium oxide photocatalyst to be used Ishihara Sangyo ST- 01, ST-21, workpiece ST-K01 of those, ST-K03, moisture powder type STS-01, STS-02, and STS-21 -- moreover LACTI-01 [Sakai Chemical Industry 25 / SSP-/, SSP-20, SSP-M, CSB, CSB-M, and paint type], TAYCA 100 [ATM-], ATM-600, and ST-157 grade can be mentioned. However, even if there is this invention in addition to these titanium oxide photocatalysts, of course, it can apply.

[0026] Moreover, as for the thickness of the coat layer 3, it is desirable that it is within the limits of 0.01-10 micrometers. Because, it is because it becomes difficult to fully employ said property efficiently if thickness is too small, and it will become easy to carry out the cracking crack of the coat layer 3 if thickness is too large, and it becomes the factor of a ****-proof fall. In addition, since this cracking crack is notably observed when thickness exceeds 50 micrometers, though it eases the aforementioned range, it needs to recognize the 50 micrometers concerned as the upper limit. Moreover, it can be said that a general gestalt serves as about 2-3-micrometer thickness in practice.

[0027] Furthermore, what is necessary is to choose suitably the sol applying method, the organic titanate method, a vacuum deposition, etc., and just to form them as the formation method of this coat layer 3. As long as it adopts at this time, for example, the applying method, in the application liquid used for it, you may add a solvent, a cross linking agent, a surfactant, etc. other than various kinds of aforementioned matter which raises the intensity of a titanium oxide photocatalyst and the aforementioned coat layer 3, and adhesion with a base material 1. Moreover, it is more more desirable to act latter one, although an ordinary temperature dryness type or a stoving type is sufficient as application liquid. It is because the direction which raised the intensity of the coat layer 3 by heating becomes advantageous to raising the ****-proof of a version.

[0028] On the coat layer 3, the application layer 4 which consists of a compound which can be disassembled by irradiating the light of wavelength with energy higher than the bandgap energy of a titanium oxide photocatalyst is formed. As shown in drawing 1 , as for this application layer 4 front face, the contact angle of water shows hydrophobic property at least 50 degrees or more. Incidentally, if it is made for a contact angle to become 80 degrees or more, it can be said that it is in a more desirable state. In this state, since it has become difficulty, i.e., the state where the so-called water repellence is very high, that water adheres to

application layer 4 front face so that guessing also from drawing 1 may be possible. if it says conversely. it can be said that the state with easy the ink for printing adhering on application layer 4 front face is appearing.

[0029] Below, the operation and effect about the plate for printing used as the above-mentioned composition are explained. First. in the initial state at the time of plate production for printing, the coat layer 3 aforementioned front face is adjusted. as are shown in drawing 1 , and the contact angle of water shows hydrophobic property at least 50 degrees or more. Carrying out "the initial state at the time of version production" here and "adjusting so that a hydrophobic property may be shown" specifically points out the following **** situations. First, it is carried out by forming the application layer 4 which becomes carrying out "adjusting so that a hydrophobic property may be shown" from the compound which can be disassembled into coat layer 3 front face by UV irradiation, and drying it. In addition, what is necessary is just to adopt suitably methods, such as spray coating, blade coating, deep coating, and roll coating, as this application. Moreover, dryness may be ordinary temperature or a method by any of heating And the time of coat layer 3 front face becoming hydrophobic by these "adjustment" is pointed out, and it is the thing which is "an initial state at the time of version production" and which carries out a purport convention.

[0030] having the operation which gives a hydrophobic property to the aforementioned front face as the above-mentioned compound -- of course -- it -- UV irradiation -- "-- easy -- " -- that by which oxidative degradation is carried out is desirable Specifically A ** trimethyl methoxy silane, a trimethyl ethoxy silane, Dimethyl diethoxysilane, methyl trimetoxysilane, a tetramethoxy silane, Methyl triethoxysilane, a tetrapod ethoxy silane, methyl dimethoxysilane, ARUKOKI xylan ** trimethylchlorosilanes, such as octadecyltrimethoxysilane and octadecyl triethoxysilane, A dimethyldichlorosilane, a methyltrichlorosilane, methyl dichlorosilane, Chlorosilicane ** vinyl trichlorosilanes, such as a dimethyl chlorosilicane. Vinyltriethoxysilane, gamma-chloropropyltrimetoxysilane, gamma-chloropropyl methyl dichlorosilane, gamma-chloropropyl methyl dimethoxysilane, Lacan coupling-agent ** hexamethyldisilazanes, such as gamma-chloropropyl methyldiethoxysilane and gamma-aminopropyl triethoxysilane, An N and N'-screw (trimethylsilyl) urea, N-trimethylsilyl acetamide, Phloroalkyl silane ** dimethyl hydrogen polysiloxanes, such as silazane ** perphloro alkyl trimethoxysilane, such as dimethyl trimethyl silylamine and diethyl trimethyl silylamine The silicone oil ** lauric acid of a type, a myristic acid, Fatty acids, such as a PAL thymine acid. stearin acid, and oleic acid, etc. are mentioned. However, this invention cannot be overemphasized by that it is not what is restricted only to these compounds. Furthermore, even if it dilutes and uses these compounds with a solvent if needed. it is easy to be natural [compounds].

[0031] In addition, as long as it more generally says "the initial state at the time of version production" as used in the field of above, you may regard it as the time of the start in actual presswork. That is, about a certain given arbitrary pictures, the data which digitized it are already prepared and it can be regarded as what points out the state when imprinting this on a plate. However, the stage where this digitization data is prepared may be, after performing hydrophilicity-ized processing about coat layer 3 front face mentioned later, and what was described now should not be understood strictly. That is, when defining "the initial state at the time of version production" as "the time of an actual presswork start" as mentioned above, it shall be interpreted in a wide sense.

[0032] Next, UV irradiation as shown in drawing 2 is carried out to application layer 4 front face which will be in the above-mentioned state. Based on the digital data about said picture, this UV irradiation is performed so that it may correspond to the data. In addition, ultraviolet rays here are the light of wavelength with energy higher than the bandgap energy of a titanium oxide photocatalyst. More specifically, they are the ultraviolet rays containing light with a wavelength of 400nm or less.

[0033] By this UV irradiation, as similarly shown in drawing 2 , while the coat layer 3 front face appears by the aforementioned compound which constitutes the application layer 4 being disassembled, as the front face concerned shows a hydrophilic property. it is changed. This is based on an operation of a titanium oxide photocatalyst. In addition, since it goes on by the original operation as a titanium oxide light "a catalyst", disassembly of a compound will be completed very promptly. As for the field where the ultraviolet rays in coat layer 3 front face were irradiated by these things, the contact angle of water will be in a state 10 degrees or less. This state serves as a relation exactly contrary to the state on the front face of hydrophobic in the previous application layer 4. That is, although most water will spread on coat layer 3 front face in the shape of a film, the ink for printing becomes impossible [adhering to this front face].

[0034] Incidentally, the titanium oxide photocatalyst is said in general as follows about the hydrophilicity-ized mechanism by UV irradiation. When a titanium oxide photocatalyst becomes un-hydrophilic, as shown in the drawing 3 left, oxygen is in the state where the bridge was carried out, in the front face. For this reason, a moisture child will not adhere to a front face and will demonstrate a result hydrophobic property. On the other hand, if ultraviolet rays are irradiated at this, the bridge state of previous oxygen will be dispelled, and as shown in the method of the drawing 3 right, a hydroxyl group will appear on a front face. And this hydroxyl group will adsorb the water which exists on a front face, and a hydrophilic property will be demonstrated. In addition, the gestalt which this hydroxyl group exposed on the front face tends to shift to nature to the original hydrophobic front face, if it is left. That is, the state where the bridge of the oxygen was carried out can say chemically that it is stable.

[0035] If processing to the above is completed, the ink for printing will be applied to the application layer 4 or coat layer 3 hydrophilicity--ization-processed front face. Then, the plate for printing as shown, for example in drawing 4 will be produced. In this drawing, the portion by which hatching was carried out is a portion into which the portion in which the above-mentioned hydrophilicity-ized processing was not made, i.e., a hydrophobic portion, and the application layer 4 remain. therefore the streak section to which the ink for printing adhered is shown, the ink for printing is crawled and the portion of one ground. i.e., a hydrophilic portion, and the coat layer 3 surface portion show the non-streak section by which the adhesion was not made. Thus. when a pattern emerges, this plate for printing will have the operation as a parent version.

[0036] Then, the usual presswork is performed and this is terminated. And to the plate for printing which finished this printing, the application layer 4 which consists of a compound which was again mentioned above is formed. Therefore, the plate for printing will have returned to "the initial state at the time of version production" again in the stage which finished this application That is, on coat layer 3 front face, the application layer 4 in which adhesion of the ink for printing can adhere to the whole surface will be formed at this time, and the hydrophobic property will be shown, and if UV irradiation is again performed on this front face, it will become possible to produce the new parent version for printing. Speaking directly, the plate for printing in this operation gestalt being what can be used repeatedly, if the reuse puts in another way.

[0037] The graph shown in drawing 5 shows collectively what was explained above. It is the graph with which this took time along the horizontal axis and took the contact angle of water along the vertical axis, and it is shown about the plate for printing in this operation gestalt how the contact angle (namely, a canal, a hydrophilic state) of the water of the front face changes with time in addition, this drawing -- a titanium oxide photocatalyst -- the performance applied hydrophobic if independent -- not being enough (the contact angle of the water before UV irradiation not becoming 50 degrees or more) -- since hydrophobic, it is what showed the case where the titanium oxide photocatalyst equipped with the capacity which conversion to a hydrophilic property completes promptly was used

[0038] According to this, as the coat layer 3 original front face was described above first, the contact angle of water is 20-30 degrees, and hydrophobic ability is not enough. Therefore, it is inadequate for using as the streak section with this, and this cannot be used as a plate for printing. However, this titanium oxide photocatalyst is equipped with the capacity promptly changed into a hydrophilic front face if ultraviolet rays are irradiated as shown in drawing. If it is in usual, although it is common that about 10 mins start as for this conversion, it turns out that it is completed by 1-2min in this example.

[0039] Next, the hydrophobic property of a plate will be in sufficient state as [show / in the curve A in drawing 5] by applying a compound to coat layer 3 front face, namely, forming the application layer 4 in it. Namely, it will be in the state which adhesion of ink is attained and can present use of printing. Moreover, this is got blocked and it is "an initial state at the time of version production" (drawing 5 middle point B). In addition, since it is good only by applying a compound substantially as described above in order to appear this "initial state at the time of version production", it is clear that this can be extremely completed to the inside of a short time.

[0040] Then, while performing UV irradiation and disassembling the aforementioned compound, a part of coat layer 3 front face at least] is changed as a hydrophilic portion. In addition, since hydrophobic, as shown in the curve C in drawing 5 , the thing [in / this titanium oxide photocatalyst / by both operations of that the conversion rate to a hydrophilic property uses the above large titanium oxide photocatalysts in this case since hydrophobic, and completing / as disassembly of a compound stated previously / promptly /-by original operation of titanium oxide light "catalyst" **] to complete by 1-2min is possible for the conversion to a hydrophilic property.

[0041] The plate for printing to which the above-mentioned processing was performed will adhere to the ink for printing, and actual printing will be performed as shown in the straight line D in drawing 5 . Hereafter, after printing is completed, to the plate for printing, processing of the application of a compound, UV irradiation, etc. will be performed like the above, and reuse will be presented with it.

[0042] As stated now, the plate for printing in this operation form is equipped also with the advantage which can quicken the cycle with last thing also for the advantage of being reusable. That is, according to the above, the work for realizing them is not to take time anyway also by giving a hydrophilic property also giving a hydrophobic property. Therefore, it is what has possible completing the whole presswork very promptly.

[0043] Below, the invention-in-this-application persons concerning production and printing of the plate for printing check and depend, and explain a concrete example. first, the base material made from aluminum whose thickness the area is postcard size and is 0.3mm -- preparing -- this -- the Sakai Chemical Industry make -- primer LAC PR-01 were applied and dried The thickness of the primer after dryness was 1.4 micrometers. In addition, with this primer layer, it will correspond to the interlayer 2 in drawing 1 . Then, applied titanium oxide photocatalyst coating agent ST-K03 of the Ishihara Sangyo nature, it was made to dry at 150 degrees C, and the coat layer 3 with a thickness of 0.8 micrometers was formed. Furthermore, what diluted Toshiba Silicone octadecyltrimethoxysilane (tradename TSL 8185) with ethanol to 3wt% concentration to this coat layer 3 front face, agitated slowly for 5 minutes, added [as opposed to / this solution / further] 2000 ppm of acetic acids, agitated slowly for 5 minutes again, and was used as hydrophobing processing liquid was applied by roll coating. And this was dried at 120 degrees C and the "initial state at the time of version production" explained several times by the above was made to appear.

[0044] About the plate which applied the above-mentioned hydrophobing processing liquid (namely, octadecyltrimethoxysilane) It masks mostly in paper with the black square on the front face of a plate whose one side is 2cm about a center section. Immediately after carrying out irradiation of the ultraviolet rays of illuminance 40 mW/cm2 "for 2 minutes", when the contact angle of water was measured using the CA-W type contact angle meter made from consonance surface chemistry about the UV irradiation portion into the portion which is not masked, the contact angle became "0-2 degrees", and showed hydrophilic property sufficient as the non-streak section.

[0045] This plate was attached in the SAN OFF-SET 220E DX type card printing machine made from SAN PRINTING MACHINRS, and it printed by 2500 print speeds/o'clock on eye best paper using the Toyo Ink ink HYECOO B red M/ and the Mitsubishi Heavy Industries dampening water RISOFERO 1% solution. Consequently, one side which ink does not adhere to the printing plate of the portion which irradiated ultraviolet rays, but is equivalent to the masked plate portion has printed on space the red picture of the square which is 2cm.

[0046] moreover, this -- then, what applied hydrophobing processing liquid by the same method, was made to dry this, carried out circular black masking whose diameter is 2cm to having mentioned above in the plate surface center section further to the above-mentioned plate for printing which ended printing, and irradiated the ultraviolet rays of illuminance 40 mW/cm2 for 2 minutes was made as an experiment It becomes the processing carried out in case reuse of this, i.e., the plate for printing, is aimed at. The diameter equivalent to the plate portion masked also in actual printing also by this while the contact angle of the water in a UV irradiation portion became 0-2 degrees and hydrophilic property sufficient as the non-streak section was shown was able to print on space the circular red picture which is 2cm.

[0047] Next, where a version is attached in a card printing machine, after wiping off the ink and dampening water which adhered on the printing plate and applying the aforementioned hydrophobing processing liquid by roll coating, it was made to dry by 120-degree C hot blast, and hydrophobing of the plate front face was carried out. Mostly, it masked in paper with the black equilateral triangle of this version that carried out hydrophobing processing whose one side is 2cm about a center section, and the ultraviolet rays of illuminance 40 mW/cm2 were irradiated for 10 minutes at the portion which is not masked. When printed the same with having mentioned this plate above, the red picture of the equilateral triangle whose one side which ink does not adhere to the printing plate of the portion which irradiated ultraviolet rays, but is equivalent to the masked plate portion is 2cm has printed on space.

[0048] In addition, the above-mentioned printing was performed using the printing machine 10 as shown in drawing 6. That is this printing machine 10 is what equipped the circumference with coating equipment 12, the Blanc drum 13, version cleaning equipment 14, write-in equipment 15, the inking roller 16, and the dryer 17 focusing on the version drum 11. The plate for printing is twisted around the version drum 11, and is installed.

[0049] In this printing machine 10, the actual process which presents reuse with the version which ended printing as described above is performed as follows. First, version cleaning equipment 14 is made into the state where it touched to the version drum 11, and the ink and dampening water which adhered on the outermost front face of a plate, i.e., a printing plate, are wiped off. Then, version cleaning equipment 14 is made to secede from the version drum 11, and coating equipment 12 is made into the state where the version drum 11 was touched. The aforementioned hydrophobing processing liquid is applied on the plate by this. Then, coating equipment 12 is made to secede from the version drum 11, a dryer 17 is worked, and hydrophobing processing liquid is dried. Next, based on the digital data of the picture prepared beforehand, a picture is written in the plate front face by which hydrophobing was carried out by the ultraviolet rays which write-in equipment 15 emits. If the above process is completed, the inking roller 16 and the Blanc drum 13 will be made into the state of touching to the version drum 11. And continuous printing is performed by flowing in the direction of the arrow shown in drawing 6 so that paper 18 may touch the Blanc drum 13.

[0050] As explained above, the plate for printing in this operation form can enable the reuse the property which a titanium oxide photocatalyst has, i.e., by using the conversion property to a hydrophilic property, since hydrophobic, and can decrease remarkably the amount of the plate discarded after use. Therefore, the cost in connection with the part and a plate can be reduced sharply. Moreover, since the picture writing from the digital data concerning a picture to a plate can be directly carried out by light (ultraviolet rays), digitization correspondence of presswork has accomplished it and it can plan large time shortening for the suitability, and cost reduction.

[0051] Moreover, as the top also described, the application layer 4 which consists of a compound will be formed, and, in the case of this operation form which aims at reuse for the plate for printing, speeding up of the whole presswork can be attained. The fact which disassembly of the compound concerned is promoted by original operation of titanium oxide light "a catalyst", and completes promptly contributes to this greatly. Furthermore, since hydrophobic, if the conversion rate to a hydrophilic property uses a large titanium oxide photocatalyst primarily, it will contribute to still much more speeding up greatly.

[0052] Furthermore, since it is possible for the processing which aims at reuse of the plate for printing to perform this on a printing machine, speeding up of printing work is realizable. In addition, in the above-mentioned example, since the picture writing to the 4th page of an application layer was also performed on the printing machine, quicker work can be done.

[0053] In addition, in this operation form, although an interlayer 2 is formed between a base material 1 and the coat layer 3, this invention is not limited to this. That is, an interlayer 2 does not necessarily need to prepare. In addition, it can say in this way because the main essence of this invention will be spoiled so that clearly from the upper explanation, though an interlayer 2 is not formed.

[Translation done.]

* NOTICES *

DESCRIPTION OF DRAWINGS

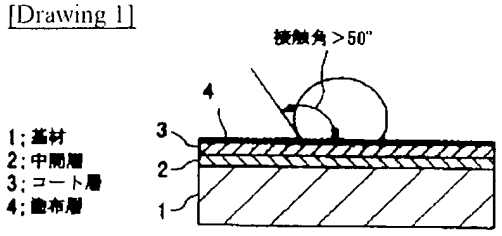
[Brief Description of the Drawings]
[Drawing 1] It is the cross section showing the composition of the plate for printing. Moreover, this drawing also shows simultaneously the state where the coat layer front face shows the hydrophobic property.
[Drawing 2] A coat layer front face is the cross section of the plate for printing in which the state which shows the hydrophilic property is shown.
[Drawing 3] It is explanatory drawing explaining conversion to the hydrophobic shell hydrophilic property in a titanium oxide photocatalyst.
[Drawing 4] It is the perspective diagram showing an example of the picture (streak section) drawn on the coat layer front face. and its ground (non-streak section).
[Drawing 5] It is the graph which showed the situation of conversion to the hydrophobic shell hydrophilic property of a coat layer front face in accordance with time.
[Drawing 6] It is explanatory drawing showing an example of the composition of a printing machine.
[Description of Notations]
1 Base Material
2 Interlayer
3 Coat Layer
10 Printing Machine

[Translation done.]

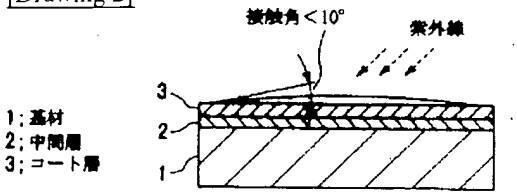
* NOTICES *

DRAWINGS

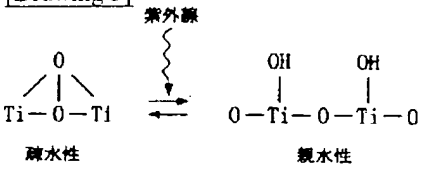
[Drawing 1]



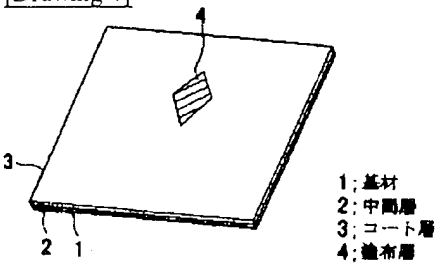
[Drawing 2]



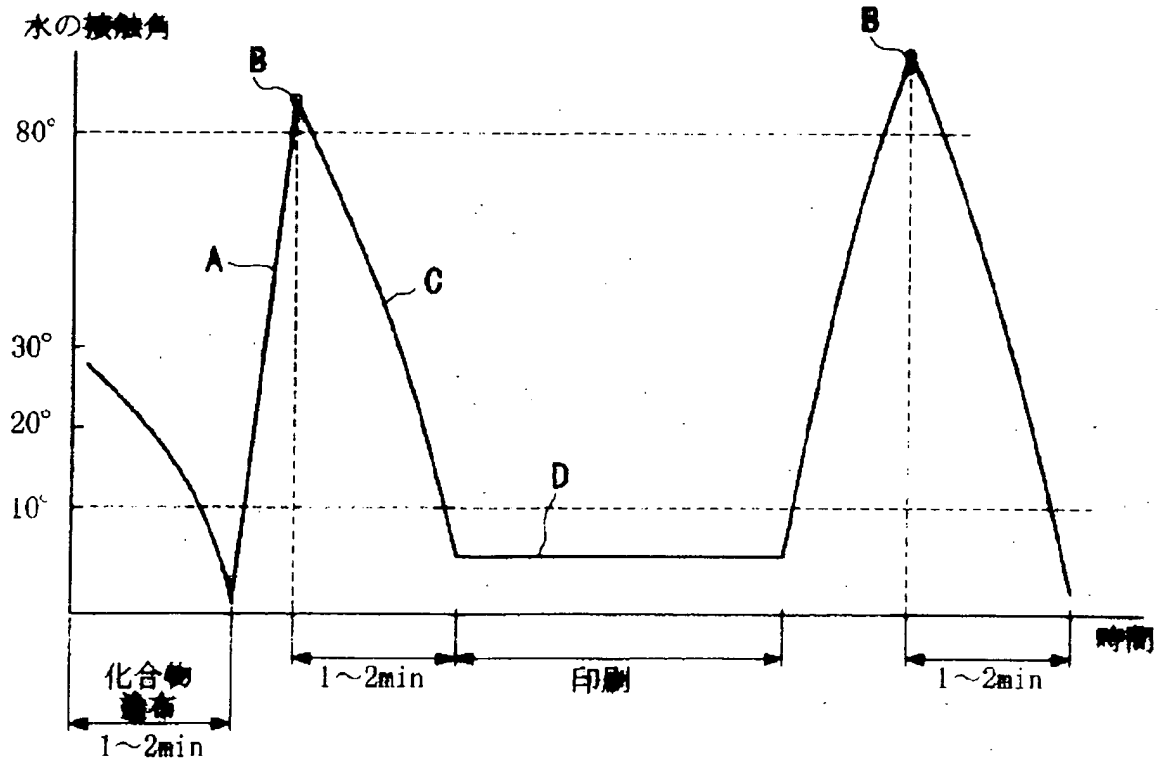
[Drawing 3]



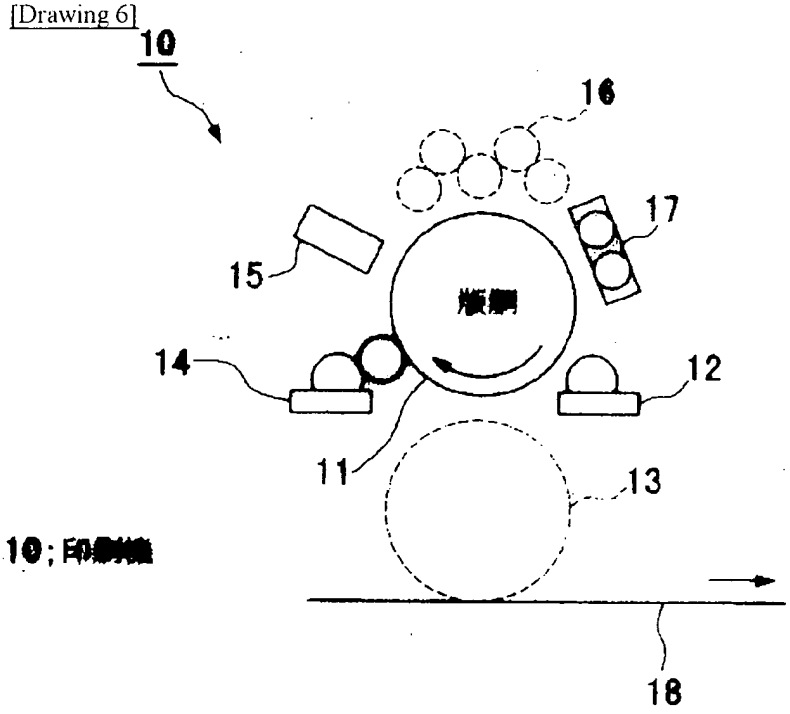
[Drawing 4]



[Drawing 5]



[Drawing 6]



10；印刷機

[Translation done.]